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COMPUTERIZED ALGORITHMS: EVALUATION OF CAPABILITY TO PREDICT GRADUATION FROM AIR FORCE TRAINING

By

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Final Report

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This report has been reviewed by the Office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

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This report contains the results of a study to compare the classification accuracy and computer resource requirements of the Motivational Attrition Prediction (MAP) computerized algorithm with the classification accuracy and computer resource requirements of other computerized statistical algorithms capable of predicting graduation from Technical Training, Basic Military Training, and Undergraduate Pilot Training. It includes descriptions of the sampled populations, sample selection from each population, independent and dependent variables, comparison of classification accuracies and required computer resources, and related research efforts.

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PREFACE

The research was completed under Project 6323, Personnel Data Analyses; Task 632305, Development of Analytic Methodology for Air Force Personnel Research Data.

Work Unit 63230511 was established in response to a Requirement for Personnel Research, RPR 77-14, initiated by AFMPC/DPMY entitled Development of Improved Methods for Predicting Involuntary Separation.

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COMPUTERIZED ALGORITHMS: EVALUATION OF CAPABILITY TO PREDICT GRADUATION FROM AIR FORCE TRAINING

I. INTRODUCTION

In the fall of 1977, Request for Personnel Research (RPR) 77-14, Development of Improved Methods for Predicting Involuntary Separation, was validated by the Air Force Military Personnel Center[1] (AFMPC) and was included in the Air Force Human Resources Laboratory (AFHRL) technical program. The objectives of RPR 77-14 were (a) to implement the Motivational Attrition Prediction (MAP) computer program on the UNIVAC 1108 computer system at AFHRL, (b) to compare the predictive efficiency of the MAP method with that of the AFHRL multiple linear regression technique (referred to as TRICOR) for a binary classification problem, such as prediction of retention versus attrition within the Air Force enlisted force (c) to compare MAP and TRICOR with other predictive methodologies capable of handling binary criterion situations, and (d) to evaluate the efficiency of the various predictive methodologies using other binary criteria such as graduation/elimination from Technical Training, Basic Military Training (BMT), and Undergraduate Pilot Training (UPT). An earlier report (Albert, 1980) documents in detail research carried out at AFHRL in support of objectives (a) to (c). The present report describes the research accomplished in support of objective (d).

The earlier report (Albert, 1980) includes descriptions of the events leading to the initiation of the RPR, computerized statistical algorithms, subsample selection from the first-term airman population, independent and dependent variables, model formulation and analysis, comparison of required computer resources, and related research efforts. A major difference between this effort and the earlier effort is that the test design for the Technical Training, BMT, and UPT studies required the cross-validation samples to be randomly selected from personnel who entered training in a *subsequent* time frame to the one serving as a data base for creation of the validation samples; whereas, the study concerned with the prediction of involuntary separation within the Air Force enlisted force used validation and cross-validation samples selected from the *same* time frame. The design of current studies more closely simulates a real-world prediction problem in that data from one time period are used to develop a model for prediction into the next time period.

Sections II to VI of this report describe the statistical methodologies, the creation and analysis of the Technical Training, BMT, and UPT data bases, and comparison of the computer resources required. Numerous tables are displayed for comparative purposes, and results and recommendations are provided.

II. DESCRIPTION OF STATISTICAL METHODOLOGIES

Three statistical methodologies examined in this report for their ability to correctly classify individuals as successes/failures: TRICOR, a computer programming package containing a stepwise regression algorithm; MAP, a computerized algorithm based on maximum likelihood estimation

[1]Now known as the Air Force Manpower and Personnel Center.

and utility theory; and BAYS, a computerized algorithm utilizing Bayes' formula. TRICOR has the capability to perform ordinary least squares (OLS) and standardized least squares (SLS) computations. The use of SLS allows creation of a predictive model that is independent of the units of measurement since the independent variables have been normalized to zero mean and unit variance.

Potential improvement to OLS classification accuracy in prediction problems involving a binary criterion is offered by the weighted least squares (WLS) technique. For this type of problem, the error variances are unequal. Performance of the WLS computations results in constant error variances allowing a possible decrease in the variance associated with each estimated regression coefficient; however, implementation of an efficient WLS computer programming package to perform analyses similar to those for OLS and SLS would not have allowed timely completion of the milestones associated with RPR 77-14.

The stepwise regression theory of TRICOR is presented in Dixon, 1968; Draper and Smith, 1966; Efroymson, 1960; Goldberger, 1961; Goldberger and Jochems, 1961; and Pope and Webster, 1972, the maximum likelihood estimation and utility theory of MAP in Dempsey, Sellman, and Fast, 1979, and the Attribute Bayesian Classification Decision (ABCD) theory of BAYS in Moonan, 1972. The limitations on the computerized implementations of each algorithm are discussed in Albert, 1980.

III. COMPARISON OF STATISTICAL METHODOLOGIES USING TECHNICAL TRAINING DATA BASE

Technical Training Population

The population used to create a Technical Training data base consisted of 17,562 airmen who entered Technical Training in 1976 and 1977 for the following Air Force specialties: Apprentice Tactical Aircraft Maintenance Specialist (Air Force Specialty Code (AFSC) 43131), Apprentice Aircraft Armament Systems Specialist (AFSC 46230), Apprentice Inventory Management Specialist (AFSC 64530), and Apprentice Security Specialist (AFSC 81130). These specialities were chosen because they afforded a reasonable compromise among several desirable population characteristics including a representative cross-section of Technical Training courses, graduation rates that were not essentially equal to one, and a large number of individuals enrolled. In addition, the 1976 and 1977 time frame corresponded to the most recent data base available from AFHRL Technical Training master files. Table 1 presents a classification of the population by AFSC and year entered training.

Table 1. **Number of Technical Trainees by AFSC and Year Entered Training**

AFSC	Year Entered Training 1976	Year Entered Training 1977
43131	3,431	4,946
46230	832	1,956
64530	1,275	1,450
81130	1,811	1,861

In order that each case could be classified into a criterion category in a meaningful way, training termination designators were grouped and recoded in the following manner: designators reflecting graduation were recoded to a value of one and designators reflecting undesirable eliminations such as academic, unfitness or unsuitability were recoded to a value of zero. This definition of the criterion categories parallels the criterion categorization used in the attrition/retention study (Albert, 1980). The percentage of graduates for each AFSC is shown in Table 2.

Table 2. **Number and Percentage of Technical Training Graduates/Non-Graduates by Year Entered Training**

	Year Entered Training							
	1976				1977			
	Graduates		Nongraduates		Graduates		Nongraduates	
AFSC	Number	Percent	Number	Percent	Number	Percent	Number	Percent
43131	3,314	96.6	117	3.4	4,805	97.1	141	2.9
46230	759	91.2	73	8.8	1,820	93.0	136	7.0
64530	1,209	94.8	66	5.2	1,374	94.8	76	5.2
81130	1,703	94.0	108	6.0	1,637	88.0	224	12.0

Description of Independent Variables

Using the AFHRL Technical Training master files and Processing and Classification of Enlistees (PACE) file, information was gathered on the following variables for the airmen in the population:

1. Scores from the aptitude tests (Administrative, Mechanical, Electrical, and General) of the Armed Services Vocational Aptitude Battery (ASVAB).

2. Scores from the Armed Forces Qualification Test (AFQT) composite of the ASVAB.

3. Drug use admission (PDA) score (LaChar, Sparks, Larsen, and Bisbee, 1974).

4. Education—Coded as 0 (1) denoting number of years required to reach highest level of education less than 12 (greater than or equal to 12). That is, if the number of years required to reach the highest level of education was less than 12, this variable was assigned a value of 0. Otherwise, this variable was assigned a value of 1.

5. Emotional instability (PEI) score (LaChar et al., 1974).

6. High school courses — The following courses were coded as 1 (0) denoting completion (incompletion):

a. Algebra
b. Biology
c. Business mathematics
d. Chemistry
e. General science
f. Geometry
g. Journalism
h. Photography
i. Physics
j. Trigonometry
k. English
l. General business
m. Driver training
n. Home economics
o. Statistics
p. General mathematics
q. Shop mathematics

7. Age — *Age in years at enlistment.*

Tables A1 through A96 in Appendix A present distributions, means, standard deviations, and intercorrelations of the independent variables for each combination of AFSC and year entered training.

Selection of samples

As alluded to earlier, airmen who entered Technical Training in 1976 comprised the population from which the validation samples were selected; similarly, cross-validation samples were selected from the population of airmen who entered training in 1977. With the exception of airmen who entered Technical Training in 1976 for AFSC 46230, random samples of 500 and 1,000 cases were drawn without replacement for each combination of AFSC and year entered training; therefore, each case could appear only once in each sample but could appear in both the 500 and 1,000 case samples. An additional requirement for the sample selection was that each sample contain the same percentage of graduates as the population from which it was drawn. For the airmen who entered training in 1976 for AFSC 46230, a random sample of 500 cases was drawn as in the previous manner; however, the 832 cases comprising the population were selected as the sample corresponding to the samples of 1,000 cases selected for the other combinations of AFSC and year entered training.

Comparison of Classification Accuracy

For each AFSC, three sets of independent variables were examined. Factors influencing the selection of these 12 variable sets which are shown in Table 3 were the following: (a) results of the previous study concerning the prediction of involuntary separation within the Air Force enlisted force, (b) regressions of the criterion on a large number of independent variables for each AFSC, (c) large increases in processing time as the number of independent variables associated with the BAYS computations increases, and (d) limitations on the number of independent variables compatible with a MAP analysis.

The classification accuracy results associated with the application of the TRICOR, BAYS, and MAP algorithms to a variety of binary prediction problems were compared. These results are presented in the form of hit tables (Tables 4 to 12). As an example of the information conveyed by a hit table, the TRICOR hit table associated with AFSC 64530 for the 500-case validation sample using Variable Set II will be described in detail. As shown in Table 8, 473 individuals who were graduates (i.e., assigned a criterion value of 1) were classified as graduates and 3 individuals who were nongraduates (i.e., assigned a criterion value of 0) were classified as nongraduates. In addition, 22 individuals who were nongraduates were classified as graduates and 2 individuals who were graduates were classified as nongraduates. Therefore, 476 (or 473 + 3) individuals were correctly classified and 24 (or 22 + 2) individuals were incorrectly classified. The classification accuracy for the validation sample was 95.2% and for the cross-validation sample was 94.6% . The term "base rate" in the table is defined as the percentage of correct classifications that would result if all individuals in the sample were classified into the criterion category representing graduation; therefore, a comparison of base rate with classification accuracy is important in evaluating the predictive utility of a classification algorithm. An efficient algorithm would be expected to yield classification accuracy results somewhat higher than the base rate. Another desirable property for the algorithm would be consistent results across the particular class of problems under investigation.

The TRICOR results are hit tables generated by the OLS methodology. Hit tables associated with the SLS methodology were generated for all problems, but their classification accuracies were so similar to the OLS classification accuracies that they are not included in this report. The maximum difference in classification accuracy between OLS and SLS for all AFSC-sample size-variable set combinations was .6%,

Table 3. **Sets of Independent Variables for Technical Training Study**

	AFSC											
	43131			46230			64530			81130		
Variable	I	II	III	I	II	III	I	II	III	I	II	III
Mechanical	X	X	X	X	X	X				X	X	X
Administrative	X											
General		X	X				X	X	X		X	
Electrical		X	X				X	X	X			
AFQT		X	X		X			X	X			
Education					X		X	X	X	X	X	X
Algebra		X	X	X	X	X					X	X
Biology							X	X	X			
Business Math						X				X	X	
Chemistry	X	X	X	X	X					X		
General Science			X					X	X			
Geometry	X	X					X	X	X		X	
Journalism										X		X
Photography									X	X		
Physics				X	X	X				X		
Trigonometry					X							
English	X	X		X	X	X		X	X			
General Business											X	X
Driver Training							X	X	X			
Home Economics									X			
Statistics	X	X			X							
General Math										X	X	X
Shop Math									X		X	
Age[a]				X	X	X		X	X	X	X	X
PEI			X	X								
PDA	X	X	X		X		X	X	X	X	X	X

X—denotes presence of variable.
[a]For AFSCs 46230 and 81130, coded as 0 (1) denoting age in years at enlistment less than 18 (greater than or equal to 18).

with the majority of the problems exhibiting no difference; therefore, any comparison of classification accuracies among the MAP, BAYS, and least squares methodologies could be based on either the OLS or SLS results. OLS was chosen as the representative methodology of the least squares technique because the number of operations required to perform this TRICOR option is less than the number required for SLS.

Tables 4 to 12 present results of the MAP, TRICOR, and BAYS algorithms applied to a validation and cross-validation sample for each combination of AFSC, sample size, and variable set. As can be observed from these tables, there was little difference among the methodologies in their abilities to correctly classify the sampled cases into the two criterion categories. For example, the classification accuracies from applying MAP and TRICOR to the validation and cross-validation samples differed by less than 1% for all combinations of AFSC, sample size, and variable set, with neither methodology exhibiting consistent superiority. For the 23 validation samples for which the MAP algorithm converged, the classification accuracies for TRICOR were greater than those for MAP for four problems and equal for 15 problems. For the corresponding 23 cross-validation samples, the classification accuracies for TRICOR were greater than those for MAP for 10 problems and equal for 11 problems.

Table 4. **Hit Tables of MAP Applied to Variable Set I for Each Combination of AFSC and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
AFSC 43131							
Sample Size — 500	1	485		15	485		15
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
Sample Size — 1000	1	970		30	970		30
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
AFSC 46230							
Sample Size — 500	1	452		45	460		34
	0	3		0	5		1
Classification Accuracy (%)			90.4			92.2	
Sample Size — 1000[a]	1	758		72	928		69
	0	1		1	2		1
Classification Accuracy (%)			91.2			92.9	
AFSC 64530							
Sample Size — 500	1	475		23	473		25
	0	0		2	2		0
Classification Accuracy (%)			95.4			94.6	
Sample Size — 1000	1	949		49	948		49
	0	1		1	2		1
Classification Accuracy (%)			95.0			94.9	
AFSC 81130							
Sample Size — 500	1	470		30	440		60
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	
Sample Size — 1000	1	940		60	879		119
	0	0		0	1		1
Classification Accuracy (%)			94.0			88.0	

[a]The validation sample contains 832 cases.

Table 5. **Hit Tables of MAP Applied to Variable Set II for Each Combination of AFSC and Sample Size**

		Validation		Cross Validation	
		Actual		Actual	
	Predicted	1	0	1	0
AFSC 43131					
Sample Size — 500	1	485	13	482	14
	0	0	2	3	1
Classification Accuracy (%)		97.4		96.6	
Sample Size — 1000	1	970	30	969	30
	0	0	0	1	0
Classification Accuracy (%)		97.0		96.9	
AFSC 46230					
Sample Size — 500	1	455	45	465	35
	0	0	0	0	0
Classification Accuracy (%)		91.0		93.0	
Sample Size — 1000[a]	1	756	72	929	70
	0	3	1	1	0
Classification Accuracy (%)		91.0		92.9	
AFSC 64530					
Sample Size — 500	1	473	21	473	25
	0	2	4	2	0
Classification Accuracy (%)		95.4		94.6	
Sample Size — 1000	1	947	45	945	48
	0	3	5	5	2
Classification Accuracy (%)		95.2		94.7	
AFSC 81130					
Sample Size — 500	1	470	30	440	60
	0	0	0	0	0
Classification Accuracy (%)		94.0		88.0	
Sample Size — 1000	1	940	60	879	120
	0	0	0	1	0
Classification Accuracy (%)		94.0		87.9	

[a]The validation sample contains 832 cases.

Table 6. **Hit Tables of MAP Applied to Variable Set III for Each Combination of AFSC and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
AFSC 43131							
Sample Size — 500	1	484		15	485		15
	0	1		0	0		0
Classification Accuracy (%)			96.8			97.0	
Sample Size — 1000	1	970		30	968		30
	0	0		0	0		0
Classification Accuracy (%)			97.0			96.8	
AFSC 46230							
Sample Size — 500	1	455		45	465		35
	0	0		0	0		0
Classification Accuracy (%)			91.0			93.0	
Sample Size — 1000[a]	1	759		73	930		70
	0	0		0	0		0
Classification Accuracy (%)			91.2			93.0	
AFSC 64530							
Sample Size — 500	1	475		22	471		25
	0	0		3	4		0
Classification Accuracy (%)			95.6			94.2	
Sample Size — 1000	1						
	0						
Classification Accuracy (%)			*				
AFSC 81130							
Sample Size — 500	1	470		30	440		60
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	
Sample Size — 1000	1	940		60	879		120
	0	0		0	1		0
Classification Accuracy (%)			94.0			87.9	

[a]The validation sample contains 832 cases.
*The MAP algorithm did not converge.

Table 7. **Hit Tables of TRICOR Applied to Variable Set I for Each Combination of AFSC and Sample Size**

	Predicted	Validation Actual 1		Validation Actual 0	Cross Validation Actual 1		Cross Validation Actual 0
AFSC 43131							
Sample Size — 500	1	485		15	485		15
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
Sample Size — 1000	1	970		30	970		30
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
AFSC 46230							
Sample Size — 500	1	455		45	465		35
	0	0		0	0		0
Classification Accuracy (%)			91.0			93.0	
Sample Size — 1000[a]	1	759		73	930		70
	0	0		0	0		0
Classification Accuracy (%)			91.2			93.0	
AFSC 64530							
Sample Size — 500	1	474		22	474		25
	0	1		3	1		0
Classification Accuracy (%)			95.4			94.8	
Sample Size — 1000	1	950		50	950		50
	0	0		0	0		0
Classification Accuracy (%)			95.0			95.0	
AFSC 81130							
Sample Size — 500	1	470		29	439		60
	0	0		1	1		0
Classification Accuracy (%)			94.2			87.8	
Sample Size — 1000	1	940		60	880		120
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	

[a]The validation sample contains 832 cases.

Table 8. **Hit Tables of TRICOR Applied to Variable Set II for Each Combination of AFSC and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
AFSC 43131							
Sample Size — 500	1	483		13	480		12
	0	2		2	5		3
Classification Accuracy (%)			97.0			96.6	
Sample Size — 1000	1	970		30	970		30
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
AFSC 46230							
Sample Size — 500	1	455		45	465		35
	0	0		0	0		0
Classification Accuracy (%)			91.0			93.0	
Sample Size — 1000[a]	1	759		73	930		70
	0	0		0	0		0
Classification Accuracy (%)			91.2			93.0	
AFSC 64530							
Sample Size — 500	1	473		22	472		24
	0	2		3	3		1
Classification Accuracy (%)			95.2			94.6	
Sample Size — 1000	1	950		50	950		50
	0	0		0	0		0
Classification Accuracy (%)			95.0			95.0	
AFSC 81130							
Sample Size — 500	1	470		30	440		60
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	
Sample Size — 1000	1	940		60	880		120
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	

[a]The validation sample contains 832 cases.

Table 9. **Hit Tables of TRICOR Applied to Variable Set III for Each Combination of AFSC and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
AFSC 43131							
Sample Size — 500	1	485		13	482		13
	0	0		2	3		2
Classification Accuracy (%)			97.4			96.8	
Sample Size — 1000	1	970		30	970		30
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
AFSC 46230							
Sample Size — 500	1	455		45	465		35
	0	0		0	0		0
Classification Accuracy (%)			91.0			93.0	
Sample Size — 1000[a]	1	759		73	930		70
	0	0		0	0		0
Classification Accuracy (%)			91.2			93.0	
AFSC 64530							
Sample Size — 500	1	471		20	471		25
	0	4		5	4		0
Classification Accuracy (%)			95.2			94.2	
Sample Size — 1000	1	950		49	948		50
	0	0		1	2		0
Classification Accuracy (%)			95.1			94.8	
AFSC 81130							
Sample Size — 500	1	470		30	440		60
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	
Sample Size — 1000	1	940		60	880		120
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	

[a]The validation sample contains 832 cases.

Table 10. **Hit Tables of BAYS Applied to Variable Set I for Each Combination of AFSC and Sample Size**

	Predicted	Validation Actual 1	Validation Actual 0	Cross Validation Actual 1	Cross Validation Actual 0
AFSC 43131					
Sample Size — 500	1	485	15	485	15
	0	0	0	0	0
Classification Accuracy (%)		97.0		97.0	
Sample Size — 1000	1	970	30	970	30
	0	0	0	0	0
Classification Accuracy (%)		97.0		97.0	
AFSC 46230					
Sample Size — 500	1	455	44	460	34
	0	0	1	5	1
Classification Accuracy (%)		91.2		92.2	
Sample Size — 1000[a]	1	759	73	930	70
	0	0	0	0	0
Classification Accuracy (%)		91.2		93.0	
AFSC 64530					
Sample Size — 500	1	475	23	473	25
	0	0	2	2	0
Classification Accuracy (%)		95.4		94.6	
Sample Size — 1000	1	949	47	944	50
	0	1	3	6	0
Classification Accuracy (%)		95.2		94.4	
AFSC 81130					
Sample Size — 500	1	470	29	439	60
	0	0	1	1	0
Classification Accuracy (%)		94.2		87.8	
Sample Size — 1000	1	940	60	880	120
	0	0	0	0	0
Classification Accuracy (%)		94.0		88.0	

[a]The validation sample contains 832 cases.

Table 11. **Hit Tables of BAYS Applied to Variable Set II for Each Combination of AFSC and Sample Size**

	Predicted	Validation Actual 1		Validation Actual 0	Cross Validation Actual 1		Cross Validation Actual 0
AFSC 43131							
Sample Size — 500	1	485		15	485		15
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
Sample Size — 1000	1	970		30	970		30
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
AFSC 46230							
Sample Size — 500	1	455		44	465		35
	0	0		1	0		0
Classification Accuracy (%)			91.2			93.0	
Sample Size — 1000[a]	1	758		71	930		70
	0	1		2	0		0
Classification Accuracy (%)			91.3			93.0	
AFSC 64530							
Sample Size — 500	1	475		23	473		25
	0	0		2	2		0
Classification Accuracy (%)			95.4			94.6	
Sample Size — 1000	1	950		47	943		49
	0	0		3	7		1
Classification Accuracy (%)			95.3			94.4	
AFSC 81130							
Sample Size — 500	1	470		29	440		58
	0	0		1	0		2
Classification Accuracy (%)			94.2			88.4	
Sample Size — 1000	1	940		60	880		120
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	

[a]The validation sample contains 832 cases.

Table 12. **Hit Tables of BAYS Applied to Variable Set III for Each Combination of AFSC and Sample Size**

	Predicted	Validation Actual 1		Validation Actual 0	Cross Validation Actual 1		Cross Validation Actual 0
AFSC 43131							
Sample Size — 500	1	485		13	483		15
	0	0		2	2		0
Classification Accuracy (%)			97.4			96.6	
Sample Size — 1000	1	970		30	970		30
	0	0		0	0		0
Classification Accuracy (%)			97.0			97.0	
AFSC 46230							
Sample Size — 500	1	455		45	465		35
	0	0		0	0		0
Classification Accuracy (%)			91.0			93.0	
Sample Size — 1000[a]	1	759		73	930		70
	0	0		0	0		0
Classification Accuracy (%)			91.2			93.0	
AFSC 64530							
Sample Size — 500	1	475		23	473		25
	0	0		2	2		0
Classification Accuracy (%)			95.4			94.6	
Sample Size — 1000	1	950		47	943		49
	0	0		3	7		1
Classification Accuracy (%)			95.3			94.4	
AFSC 81130							
Sample Size — 500	1	470		30	440		60
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	
Sample Size — 1000	1	940		60	880		120
	0	0		0	0		0
Classification Accuracy (%)			94.0			88.0	

[a]The validation sample contains 832 cases.

As discussed by Albert (1980) the MAP algorithm utilizes an iterative technique (Brown, 1967) to solve a system of simultaneous nonlinear equations and does not always converge, denying the researcher a direct comparison of the predictive accuracy of MAP versus TRICOR or BAYS. All classification accuracy comparisons discussed in this report refer to the problems for which the MAP algorithm converged. As denoted in Table 6, the MAP algorithm did not converge for the 1,000-case sample from AFSC 64530 using Variable Set III; therefore, a classification accuracy comparison between MAP and TRICOR or BAYS was not possible for this problem.

As shown in Tables 4 to 6 and 10 to 12, the classification accuracies from applying MAP and BAYS to the validation and cross-validation samples differed by less than 1% for all combinations of AFSC, sample size, and variable set, with neither methodology exhibiting consistent superiority. For the 23 validation samples, the classification accuracies for BAYS were greater than those for MAP for 8 problems and equal for 13 problems. For the 23 cross-validation samples, the classification accuracies for BAYS were greater than those for MAP for 9 problems and equal for 10 problems. A similar comparison for BAYS and TRICOR can be derived from Tables 7 to 12. As in the other comparisons, the classification accuracies differed by less than 1% for all combinations of AFSC, sample size, and variable set. For the 24 validation samples, the classification accuracies for BAYS were greater than those for TRICOR for 9 problems and equal for 15 problems and for the 24 cross-validation samples, the classification accuracies for BAYS were greater than those for TRICOR for 3 problems and equal for 15 problems. Therefore, for the problems in which a difference in classification accuracy was observed, TRICOR had a larger value than MAP for 70% of the problems, BAYS had a larger value than MAP for 74% of the problems, and BAYS had a larger value than TRICOR for 67% of the problems. In evaluating the importance of these results in the identification of a superior classification algorithm, consideration is given also to (a) the large number of problems for which no difference in classification accuracy was observed, (b) all differences in classification accuracy were less than 1% , and (c) none of the methodologies showed classification accuracy results consistently higher than the base rate. Regarding the performance of each algorithm as a function of AFSC/sample size/variable set, there was little difference in their abilities to correctly classify individuals as graduates/nongraduates.

Using the AFHRL automatic interaction detector algorithm, AID-4 (Gott & Koplyay, 1977; Koplyay, Gott & Elton, 1973), interactive terms were identified in an effort to improve classification accuracy by adding these variables to the appropriate set of independent variables. (The reader can recall that a similar analysis performed for the attrition/retention study (Albert, 1980) yielded little gain in predictive efficiency. In addition, the inclusion of interactive terms resulted in MAP convergence difficulties.) Using the large samples from AFSCs 46230 and 81130 and Variable Set I augmented with interactive terms, hit tables were computed and compared with previous results. The inclusion of AID-4 identified interaction terms in the model-building process did not yield a large enough increase in classification accuracy to justify the development of a more complicated model. From these results, no further attempts to improve classification accuracy utilizing interactive terms were made.

IV. COMPARISON OF STATISTICAL METHODOLOGIES USING BASIC MILITARY TRAINING DATA BASE

Basic Military Training Population

The population consisted of 30,249 airmen who entered BMT in 1976 and 30,517 airmen who entered BMT in 1977. The 1976 and 1977 time frame corresponded to the most recent data base available from AFHRL master files. The dependent variable was defined in a manner similar to that employed for

the attrition/retention and technical training studies. Disposition codes/separation designation numbers (DCs/SDNs) reflecting graduation were recoded to a value of one and DCs/SDNs reflecting undesirable eliminations, such as marginal productivity/inaptitude, unfitness, or unsuitability, were recoded to a value of zero. For the 1976 subpopulation, 29,636 cases were recoded to one with the remaining cases recoded to zero; for the 1977 subpopulation, 29,801 cases were recoded to one with the remaining cases recoded to zero, that is, 98.0% of the cases in the 1976 subpopulation were coded as successes and 2.0% were coded as failures. Moreover, 97.7% of the cases in the 1977 subpopulation were coded as successes and 2.3% were coded as failures.

Description of Independent Variables

The same set of aptitudinal, educational, and biographical variables used in the Technical Training analyses were used in the BMT statistical comparisons. Tables A97 to A120 present distributions, means, standard deviations, and intercorrelations of the independent variables for each subpopulation.

Selection of Samples

Three random samples of 500, 1,000, and 2,000 cases were drawn from each subpopulation with the requirement that the three samples of each particular size contain 98%, 95%, and 90% graduates. Each case could appear only once in each sample but could appear in more than one sample. The samples selected from the airmen who entered BMT in 1976 (1977) correspond to validation (cross-validation) samples. A schematic representation of the sample layout is shown in Figure 1. Although three base rates were selected in order that the statistical methodologies could be compared in a variety of problem settings, attention was primarily focused on the 98% base rate, which closely approximates the percentage of graduates in the population.

Comparison of Classification Accuracy

Three sets of independent variables which are shown in Table 13 were examined. These variable sets were chosen utilizing considerations similar to those employed in selecting the variable sets for the technical training study. Tables 14 to 22 present results of the MAP, TRICOR, and BAYS methodologies applied to a validation and cross-validation sample for each combination of sample size, base rate, and variable set. It can be seen from the tables that the MAP algorithm did not converge for six combinations; therefore, classification accuracy comparisons between MAP and TRICOR or BAYS were not conducted for these problems. As in the technical training study, the TRICOR results are hit tables generated by the OLS methodology. Since the maximum difference in classification accuracy between SLS and OLS for all combinations of sample size, base rate, and variable set was .4% with neither methodology exhibiting clear superiority, the corresponding SLS hit tables are not provided in this report; therefore, comparisons of classification accuracies among the MAP, BAYS, and least squares methodologies could employ either the SLS or the OLS results. The OLS results were chosen as the basis of comparison due to considerations presented earlier.

As can be observed from Tables 14 to 22, there was little difference among the methodologies in their ability to correctly classify the sampled cases into the two criterion categories. The classification accuracies from applying MAP and TRICOR to the validation and cross-validation samples differed by less than 2% for all combintions of sample size, base rate, and variable set. For the 21 validation samples, the classification accuracies for MAP were greater than those for TRICOR for eight problems and equal for eight problems and for the 21 cross-validation samples, the classification accuracies for MAP were greater than those for TRICOR for nine problems and equal for eight problems. As shown in Tables 14 to 16 and

Sample	Sample Size	Sample Type	P (base rate)	Q
1	500	Validation	98	2
2	500	Cross-validation	98	2
3	500	Validation	95	5
4	500	Cross-validation	95	5
5	500	Validation	90	10
6	500	Cross-validation	90	10
7	1,000	Validation	98	2
8	1,000	Cross-validation	98	2
9	1,000	Validation	95	5
10	1,000	Cross-Validation	95	5
11	1,000	Validation	90	10
12	1,000	Cross-validation	90	10
13	2,000	Validation	98	2
14	2,000	Cross-validation	98	2
15	2,000	Validation	95	5
16	2,000	Cross-validation	95	5
17	2,000	Validation	90	10
18	2,000	Cross-validation	90	10

Figure 1. **Sample layout for Basic Military Training study.**

Table 13. **Sets of Independent Variables for Basic Military Training Study**

Variable	Variable Set[a] I	II	III
Administrative	X	X	X
General	X	X	X
Electrical	X	X	X
AFQT		X	X
Education	X	X	X
Algebra	X	X	X
Biology			X
Geometry		X	
Photography			X
English	X	X	X
Driver Training			X
Home Economics		X	X
Statistics			X
General Math			X
PEI	X	X	X
PDA	X	X	X

[a]X-denotes presence of variable.

Table 14. **Hit Tables of MAP Applied to Variable Set I for Each Combination of Base Rate and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
Sample Size — 500	1	450		50	450		50
Base Rate — 90%	0	0		0	0		0
Classification Accuracy (%)			90.0			90.0	
Sample Size — 1000	1	890		86	889		90
Base Rate — 90%	0	10		14	11		10
Classification Accuracy (%)			90.4			89.9	
Sample Size — 2000	1	1767		158	1750		167
Base Rate — 90%	0	33		42	50		33
Classification Accuracy (%)			90.4			89.2	
Sample Size — 500	1	475		23	468		24
Base Rate — 95%	0	0		2	7		1
Classification Accuracy (%)			95.4			93.8	
Sample Size — 1000	1	948		45	943		50
Base Rate — 95%	0	2		5	7		0
Classification Accuracy (%)			95.3			94.3	
Sample Size — 2000	1	1897		95	1894		90
Base Rate — 95%	0	3		5	6		10
Classification Accuracy (%)			95.1			95.2	
Sample Size — 500	1			*			
Base Rate — 98%	0						
Classification Accuracy (%)							
Sample Size — 1000	1	980		20	980		20
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	
Sample Size — 2000	1	1959		38	1958		39
Base Rate — 98%	0	1		2	2		1
Classification Accuracy (%)			98.0			98.0	

*The MAP algorithm did not converge.

Table 15. **Hit Tables of MAP Applied to Variable Set II for Each Combination of Base Rate and Sample Size**

	Predicted	Validation Actual 1		Validation Actual 0	Cross Validation Actual 1		Cross Validation Actual 0
Sample Size — 500	1	450		50	450		50
Base Rate — 90%	0	0		0	0		0
Classification Accuracy (%)			90.0			90.0	
Sample Size — 1000	1	890		87	890		89
Base Rate — 90%	0	10		13	10		11
Classification Accuracy (%)			90.3			90.1	
Sample Size — 2000	1			*			
Base Rate — 90%	0						
Classification Accuracy (%)							
Sample Size — 500	1	475		25	475		25
Base Rate — 95%	0	0		0	0		0
Classification Accuracy (%)			95.0			95.0	
Sample Size — 1000	1	950		46	944		46
Base Rate — 95%	0	0		4	6		4
Classification Accuracy (%)			95.4			94.8	
Sample Size — 2000	1			*			
Base Rate — 95%	0						
Classification Accuracy (%)							
Sample Size — 500	1	490		10	490		10
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	
Sample Size — 1000	1	980		20	980		20
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	
Sample Size — 2000	1	1960		40	1960		40
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	

*The MAP algorithm did not converge.

Table 16. **Hit Tables of MAP Applied to Variable Set III for Each Combination of Base Rate and Sample Size**

		Validation		Cross Validation	
		Actual		Actual	
	Predicted	1	0	1	0
Sample Size — 500	1	447	46	443	48
Base Rate — 90%	0	3	4	7	2
Classification Accuracy (%)		90.2		89.0	
Sample Size — 1000	1	891	85	889	88
Base Rate — 90%	0	9	15	11	12
Classification Accuracy (%)		90.6		90.1	
Sample Size — 2000	1	1761	150	1740	157
Base Rate — 90%	0	39	50	60	43
Classification Accuracy (%)		90.6		89.2	
Sample Size — 500	1	475	25	473	24
Base Rate — 95%	0	0	0	2	1
Classification Accuracy (%)		95.0		94.8	
Sample Size — 1000	1	945	41	936	46
Base Rate — 95%	0	5	9	14	4
Classification Accuracy (%)		95.4		94.0	
Sample Size — 2000	1		*		
Base Rate — 95%	0				
Classification Accuracy (%)					
Sample Size — 500	1		*		
Base Rate — 98%	0				
Classification Accuracy (%)					
Sample Size — 1000	1		*		
Base Rate — 98%	0				
Classification Accuracy (%)					
Sample Size — 2000	1	1960	40	1960	40
Base Rate — 98%	0	0	0	0	0
Classification Accuracy (%)		98.0		98.0	

*The MAP algorithm did not converge.

Table 17. **Hit Tables of TRICOR Applied to Variable Set I for Each Combination of Base Rate and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
Sample Size — 500	1	450		50	450		50
Base Rate — 90%	0	0		0	0		0
Classification Accuracy (%)			90.0			90.0	
Sample Size — 1000	1	888		85	888		89
Base Rate — 90%	0	12		15	12		11
Classification Accuracy (%)			90.3			89.9	
Sample Size — 2000	1	1756		150	1738		157
Base Rate — 90%	0	44		50	62		43
Classification Accuracy (%)			90.3			89.0	
Sample Size — 500	1	474		22	466		23
Base Rate — 95%	0	1		3	9		2
Classification Accuracy (%)			95.4			93.6	
Sample Size — 1000	1	948		46	943		49
Base Rate — 95%	0	2		4	7		1
Classification Accuracy (%)			95.2			94.4	
Sample Size — 2000	1	1894		92	1887		93
Base Rate — 95%	0	6		8	13		7
Classification Accuracy (%)			95.1			94.7	
Sample Size — 500	1	490		10	490		10
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	
Sample Size — 1000	1	980		20	980		20
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	
Sample Size — 2000	1	1952		37	1956		39
Base Rate — 98%	0	8		3	4		1
Classification Accuracy (%)			97.8			97.8	

Table 18. **Hit Tables of TRICOR Applied to Variable Set II for Each Combination of Base Rate and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
Sample Size — 500	1	450		50	450		50
Base Rate — 90%	0	0		0	0		0
Classification Accuracy (%)			90.0			90.0	
Sample Size — 1000	1	882		81	880		85
Base Rate — 90%	0	18		19	20		15
Classification Accuracy (%)			90.1			89.5	
Sample Size — 2000	1	1759		153	1742		159
Base Rate — 90%	0	41		47	58		41
Classification Accuracy (%)			90.3			89.2	
Sample Size — 500	1	474		21	462		20
Base Rate — 95%	0	1		4	13		5
Classification Accuracy (%)			95.6			93.4	
Sample Size — 1000	1	946		44	938		44
Base Rate — 95%	0	4		6	12		6
Classification Accuracy (%)			95.2			94.4	
Sample Size — 2000	1	1890		85	1867		83
Base Rate — 95%	0	10		15	33		17
Classification Accuracy (%)			95.2			94.2	
Sample Size — 500	1	489		8	490		10
Base Rate — 98%	0	1		2	0		0
Classification Accuracy (%)			98.2			98.0	
Sample Size — 1000	1	980		20	980		20
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	
Sample Size — 2000	1	1952		37	1956		39
Base Rate — 98%	0	8		3	4		1
Classification Accuracy (%)			97.8			97.8	

Table 19. **Hit Tables of TRICOR Applied to Variable Set III for Each Combination of Base Rate and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
Sample Size — 500	1	448		46	447		48
Base Rate — 90%	0	2		4	3		2
Classification Accuracy (%)			90.4			89.8	
Sample Size — 1000	1	893		86	893		91
Base Rate — 90%	0	7		14	7		9
Classification Accuracy (%)			90.7			90.2	
Sample Size — 2000	1	1765		154	1749		164
Base Rate — 90%	0	35		46	51		36
Classification Accuracy (%)			90.6			89.2	
Sample Size — 500	1	475		22	469		24
Base Rate — 95%	0	0		3	6		1
Classification Accuracy (%)			95.6			94.0	
Sample Size — 1000	1	948		45	942		48
Base Rate — 95%	0	2		5	8		2
Classification Accuracy (%)			95.3			94.4	
Sample Size — 2000	1	1893		88	1877		88
Base Rate — 95%	0	7		12	23		12
Classification Accuracy (%)			95.2			94.4	
Sample Size — 500	1	489		8	490		10
Base Rate — 98%	0	1		2	0		0
Classification Accuracy (%)			98.2			98.0	
Sample Size — 1000	1	980		20	980		20
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	
Sample Size — 2000	1	1960		40	1960		40
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	

Table 20. **Hit Tables of BAYS Applied to Variable Set I for Each Combination of Base Rate and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
Sample Size — 500	1	445		42	440		45
Base Rate — 90%	0	5		8	10		5
Classification Accuracy (%)			90.6			89.0	
Sample Size — 1000	1	895		87	894		94
Base Rate — 90%	0	5		13	6		6
Classification Accuracy (%)			90.8			90.0	
Sample Size — 2000	1	1779		168	1768		185
Base Rate — 90%	0	21		32	32		15
Classification Accuracy (%)			90.6			89.2	
Sample Size — 500	1	475		21	469		22
Base Rate — 95%	0	0		4	6		3
Classification Accuracy (%)			95.8			94.4	
Sample Size — 1000	1	949		43	944		47
Base Rate — 95%	0	1		7	6		3
Classification Accuracy (%)			95.6			94.7	
Sample Size — 2000	1	1897		88	1887		87
Base Rate — 95%	0	3		12	13		13
Classification Accuracy (%)			95.4			95.0	
Sample Size — 500	1	490		8	489		10
Base Rate — 98%	0	0		2	1		0
Classification Accuracy (%)			98.4			97.8	
Sample Size — 1000	1	980		19	980		20
Base Rate — 98%	0	0		1	0		0
Classification Accuracy (%)			98.1			98.0	
Sample Size — 2000	1	1960		39	1960		40
Base Rate — 98%	0	0		1	0		0
Classification Accuracy (%)			98.0			98.0	

Table 21. **Hit Tables of BAYS Applied to Variable Set II for Each Combination of Base Rate and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
Sample Size — 500	1	445		42	440		45
Base Rate — 90%	0	5		8	10		5
Classification Accuracy (%)			90.6			89.0	
Sample Size — 1000	1	896		89	888		98
Base Rate — 90%	0	4		11	12		2
Classification Accuracy (%)			90.7			89.0	
Sample Size — 2000	1	1782		170	1770		183
Base Rate — 90%	0	18		30	30		17
Classification Accuracy (%)			90.6			89.4	
Sample Size — 500	1	475		22	470		24
Base Rate — 95%	0	0		3	5		1
Classification Accuracy (%)			95.6			94.2	
Sample Size — 1000	1	950		44	948		47
Base Rate — 95%	0	0		6	2		3
Classification Accuracy (%)			95.6			95.1	
Sample Size — 2000	1	1897		87	1885		87
Base Rate — 95%	0	3		13	15		13
Classification Accuracy (%)			95.5			94.9	
Sample Size — 500	1	489		6	489		10
Base Rate — 98%	0	1		4	1		0
Classification Accuracy (%)			98.6			97.8	
Sample Size — 1000	1	980		19	980		20
Base Rate — 98%	0	0		1	0		0
Classification Accuracy (%)			98.1			98.0	
Sample Size — 2000	1	1960		40	1960		40
Base Rate — 98%	0	0		0	0		0
Classification Accuracy (%)			98.0			98.0	

Table 22. **Hit Tables of BAYS Applied to Variable Set III for Each Combination of Base Rate and Sample Size**

		Validation			Cross Validation		
		Actual			Actual		
	Predicted	1		0	1		0
Sample Size — 500	1	450		48	448		49
Base Rate — 90%	0	0		2	2		1
Classification Accuracy (%)			90.4			89.8	
Sample Size — 1000	1	893		83	886		96
Base Rate — 90%	0	7		17	14		4
Classification Accuracy (%)			91.0			89.0	
Sample Size — 2000	1	1784		168	1770		184
Base Rate — 90%	0	16		32	30		16
Classification Accuracy (%)			90.8			89.3	
Sample Size — 500	1	475		22	468		21
Base Rate — 95%	0	0		3	7		4
Classification Accuracy (%)			95.6			94.4	
Sample Size — 1000	1	949		44	947		47
Base Rate — 95%	0	1		6	3		3
Classification Accuracy (%)			95.5			95.0	
Sample Size — 2000	1	1895		85	1880		87
Base Rate — 95%	0	5		15	20		13
Classification Accuracy (%)			95.5			94.6	
Sample Size — 500	1	489		7	490		10
Base Rate — 98%	0	1		3	0		0
Classification Accuracy (%)			98.4			98.0	
Sample Size — 1000	1	980		19	980		20
Base Rate — 98%	0	0		1	0		0
Classification Accuracy (%)			98.1			98.0	
Sample Size — 2000	1	1960		39	1960		40
Base Rate — 98%	0	0		1	0		0
Classification Accuracy (%)			98.0			98.0	

20 to 22, the classification accuracies from applying MAP and BAYS to the validation and cross-validation samples also differed by less than 2% for all combinations of sample size, base rate, and variable set, with neither methodology exhibiting consistent superiority. For the 21 validation samples, the classification accuracies for BAYS were greater than those for MAP for 18 problems and equal for three problems and for the 21 cross-validation samples, the classification accuracies for BAYS were greater than those for MAP for seven problems and equal for six problems.

Similar comparisons for BAYS and TRICOR can be derived from Tables 17 to 22. As in the earlier comparisons, the classification accuracies differed by less than 2% for all combinations of sample size, base rate, and variable set. For the 27 validation samples, the classification accuracies for BAYS were greater than those for TRICOR for 23 problems and equal for 4 problems and for the 27 cross-validation samples, the classification accuracies for BAYS were greater than those for TRICOR for 15 problems and equal for 6 problems. Therefore, for the problems in which a difference in classification accuracy was observed, TRICOR had a larger value than MAP for 35% of the problems, BAYS had a larger value than MAP for 76% of the problems, and BAYS had a larger value than TRICOR for 86% of the problems. If these results are compared to the corresponding Technical Training results, it appears that, in relation to BAYS and MAP, TRICOR does not perform as well on the BMT data set; however, consideration of the importance of this result should include the facts that no difference in classification accuracy was observed for a large number of problems and that none of the methodologies exhibited classification accuracy results consistently higher than the base rate. Regarding the performance of each algorithm as a function of base rate/ sample size/ variable set, there was little difference in their abilities to correctly classify individuals as successes/failures.

V. COMPARISON OF STATISTICAL METHODOLOGIES USING UNDERGRADUATE PILOT TRAINING DATA BASE

Undergraduate Pilot Training Population

The design and analysis of this study was influenced by conferences with personnel in the AFHRL Manpower and Personnel Division, who have considerable experience studying UPT data sets. In particular, the results of previous UPT studies impacting on the current effort were discussed in detail. This coordination resulted in a research plan complementing previous work.

Two important definitions for the dependent variable emerged. In the first definition, training status designators reflecting graduation were recoded to a value of one and those reflecting undesirable eliminations were recoded to a value of zero. In the second definition, training status designators reflecting graduation were recoded to a value of one; however, only training status designators reflecting elimination due to flying deficiency were recoded to a value of zero. Hereafter, dependent variables defined by the first and second definitions will be referred to as the first and second dependent variables, respectively. The population consisted of 6,191 individuals enrolled in UPT in FY74 to FY78. The number of individuals enrolled and percentage graduating for each fiscal year are shown in Tables 23 and 24. Of course, the set of cases for which the second dependent variable is defined is a subset of the set of cases for which the first dependent variable is defined.

Table 23. **By Fiscal Year, Number and Percentage of Undergraduate Pilot Training Graduates/Nongraduates for Which the First Dependent Variable is Defined**

Fiscal Year Enrolled in UPT	Number of Individuals Enrolled	Graduates		Nongraduates	
		Number	Percent	Number	Percent
1974	2,081	1,538	73.9	543	26.1
1975	1,617	1,264	78.2	353	21.8
1976	1,345	1,069	79.5	276	20.5
1977	606	525	86.6	81	13.4
1978	542	473	87.3	69	12.7

Table 24. **By Fiscal Year, Number and Percentage of Undergraduate Pilot Training Graduates/Nongraduates for Which the Second Dependent Variable is Defined**

Fiscal Year Enrolled in UPT	Number of Individuals Enrolled	Graduates		Nongraduates	
		Number	Percent	Number	Percent
1974	1,786	1,538	86.1	248	13.9
1975	1,430	1,264	88.4	166	11.6
1976	1,218	1,069	87.8	149	12.2
1977	563	525	93.3	38	6.7
1978	506	473	93.5	33	6.5

Description of Independent Variables

Using the AFHRL UPT files, Officer Gain/Loss file, and Uniform Officer Record file, information was gathered on the following variables for the trainees in the population:

1. Navigator, officer and pilot scores from the Air Force Officer Qualifying Test (AFOQT).
2. Age — Age in years at entrance to UPT.
3. Prior service — Coded as 0 (1) denoting months of total active federal military service less than 12 (greater than or equal to 12) at entrance to UPT.
4. Academic background — Coded as 1 (0) denoting technical (nontechnical) bachelor degree specialty.
5. Marital status — Coded as 1 (0) denoting married (single).
6. Source of commission — Coded as 1 (0) denoting Reserve Officer Training Corps (Officer Training School) graduate.

Tables A121 to A170 present distributions, means, standard deviations, and intercorrelations of the independent variables for each fiscal year.

Comparison of Classification Accuracy

As mentioned earlier, two dependent variables were defined for the UPT data base. The analyses for both dependent variables will be discussed concurrently. For the purpose of brevity, any statement that does not specifically refer to one of the dependent variables should be assumed to apply to both dependent variables.

A major difference between the analysis of the UPT data base and earlier data bases was that for the UPT data base several combinations of validation/cross-validation data sets were constructed. Each validation and cross-validation "sample" included all trainees in the population who enrolled in UPT during the fiscal year(s) encompassed by the particular sample. The six combinations of validation/cross-validation samples were the following: FY74/FY75, FY74-75/FY76, FY74-76/FY77, FY74-77/FY78, FY74/FY78 and FY77/FY78. The number of cases in each validation and cross-validation sample can be readily computed from Tables 23 or 24. Tables 25 to 30 present results of the MAP, BAYS, and TRICOR methodologies applied to the various validation/cross-validation combinations described above. As before, the TRICOR results are hit tables generated by the OLS methodology. SLS computations were performed on each validation/cross-validation

Table 25. **MAP Hit Tables Using the First Dependent Variable**

Validation/Cross-Validation Samples		Predicted	Validation Actual 1	Validation Actual 0	Cross-Validation Actual 1	Cross-Validation Actual 0
FY74/FY75		1	1537	541	1261	351
		0	1	2	3	2
	Classification Accuracy (%)		74.0		78.1	
FY74-75/FY76		1	2800	893	1068	275
		0	2	3	1	1
	Classification Accuracy (%)		75.8		79.5	
FY74-76/FY77		1	3869	1169	525	81
		0	2	3	0	0
	Classification Accuracy (%)		76.8		86.6	
FY74-77/FY78		1	4394	1250	473	69
		0	2	3	0	0
	Classification Accuracy (%)		77.8		87.3	
FY74/FY78		1	1537	541	472	68
		0	1	2	1	1
	Classification Accuracy (%)		74.0		87.3	
FY77/FY78		1	525	80	472	66
		0	0	1	1	3
	Classification Accuracy (%)		86.8		87.6	

Table 26. **TRICOR Hit Tables Using the First Dependent Variable**

Validation/Cross-Validation Samples		Predicted	Validation Actual 1		Validation Actual 0	Cross-Validation Actual 1		Cross-Validation Actual 0
FY74/FY75		1	1536		541	1261		351
		0	2		2	3		2
	Classification Accuracy (%)			73.9			78.1	
FY74-75/FY76		1	2800		893	1068		275
		0	2		3	1		1
	Classification Accuracy (%)			75.8			79.5	
FY74-76/FY77		1	3866		1167	522		80
		0	5		5	3		1
	Classification Accuracy (%)			76.8			86.3	
FY74-77/FY78		1	4393		1250	473		69
		0	3		3	0		0
	Classification Accuracy (%)			77.8			87.3	
FY74/FY78		1	1536		541	472		68
		0	2		2	1		1
	Classification Accuracy (%)			73.9			87.3	
FY77/FY78		1	525		80	473		66
		0	0		1	0		3
	Classification Accuracy (%)			86.8			87.8	

Table 27. **BAYS Hit Tables Using the First Dependent Variable**

Validation/Cross-Validation Samples		Predicted	Validation Actual 1		Validation Actual 0	Cross-Validation Actual 1		Cross-Validation Actual 0
FY74/FY75		1	1535		539	1259		350
		0	3		4	5		3
	Classification Accuracy (%)			74.0			78.0	
FY74-75/FY76		1	2802		895	1066		276
		0	0		1	3		0
	Classification Accuracy (%)			75.8			79.3	
FY74-76/FY77		1	3871		1172	525		81
		0	0		0	0		0
	Classification Accuracy (%)			76.8			86.6	
FY74-77/FY78		1	4396		1253	473		69
		0	0		0	0		0
	Classification Accuracy (%)			77.8			87.3	
FY74/FY78		1	1535		539	472		68
		0	3		4	1		1
	Classification Accuracy (%)			74.0			87.3	
FY77/FY78		1	525		79	470		68
		0	0		2	3		1
	Classification Accuracy (%)			87.0			86.9	

Table 28. **MAP Hit Tables Using the Second Dependent Variable**

Validation/Cross-Validation Samples		Predicted	Validation Actual 1		Validation Actual 0	Cross-Validation Actual 1		Cross-Validation Actual 0
FY74/FY75		1	1538		247	1262		165
		0	0		1	2		1
	Classification Accuracy (%)			86.2			88.3	
FY74-75/FY76		1	2802		413	1068		148
		0	0		1	1		1
	Classification Accuracy (%)			87.2			87.8	
FY74-76/FY77		1	3870		561	525		37
		0	1		2	0		1
	Classification Accuracy (%)			87.3			93.4	
FY74-77/FY78		1			*			
		0						
	Classification Accuracy (%)							
FY74/FY78		1	1538		247	473		32
		0	0		1	0		1
	Classification Accuracy (%)			86.2			93.7	
FY77/FY78		1	525		37	473		33
		0	0		1	0		0
	Classification Accuracy (%)			93.4			93.5	

*The MAP algorithm did not converge.

Table 29. **TRICOR Hit Tables Using the Second Dependent Variable**

Validation/Cross-Validation Samples		Predicted	Validation Actual 1		Validation Actual 0	Cross-Validation Actual 1		Cross-Validation Actual 0
FY74/FY75		1	1538		248	1264		166
		0	0		0	0		0
	Classification Accuracy (%)			86.1			88.4	
FY74-75/FY76		1	2800		413	1068		148
		0	2		1	1		1
	Classification Accuracy (%)			87.1			87.8	
FY74-76/FY77		1	3871		563	525		38
		0	0		0	0		0
	Classification Accuracy (%)			87.3			93.3	
FY74-77/FY78		1	4392		598	473		32
		0	4		3	0		1
	Classification Accuracy (%)			88.0			93.7	
FY74/FY78		1	1538		248	473		33
		0	0		0	0		0
	Classification Accuracy (%)			86.1			93.5	
FY77/FY78		1	525		37	473		33
		0	0		1	0		0
	Classification Accuracy (%)			93.4			93.5	

Table 30. **BAYS Hit Tables Using the Second Dependent Variable**

Validation/Cross-Validation Samples		Predicted	Validation Actual 1		Validation Actual 0	Cross-Validation Actual 1		Cross-Validation Actual 0
FY74/FY75		1	1538		247	1264		166
		0	0		1	0		0
	Classification Accuracy (%)			86.2			88.4	
FY74-75/FY76		1	2802		413	1069		149
		0	0		1	0		0
	Classification Accuracy (%)			87.2			87.8	
FY74-76/FY77		1	3871		563	525		38
		0	0		0	0		0
	Classification Accuracy (%)			87.3			93.3	
FY74-77/FY78		1	4396		601	473		33
		0	0		0	0		0
	Classification Accuracy (%)			88.0			93.5	
FY74/FY78		1	1538		247	471		33
		0	0		1	2		0
	Classification Accuracy (%)			86.2			93.1	
FY77/FY78		1	525		38	473		33
		0	0		0	0		0
	Classification Accuracy (%)			93.3			93.5	

combination; however, the maximum difference in classification accuracy between SLS and OLS for all combinations was .5% with the majority of the problems showing no difference. In fact, with the second dependent variable, no difference was observed for all problems. Since the SLS classification accuracies were so similar to the OLS classification accuracies, the SLS hit tables are not presented in this report.

As can be observed from Tables 25 to 30, there was little difference among the methodologies in their ability to correctly classify the sampled cases. The classification accuracies from applying MAP, TRICOR, and BAYS to all validation/cross-validation data sets differed by less than 1% for all pairwise comparisons of the three methodologies with none of the methodologies showing consistent superiority over any other methodology. For the problems in which a difference in classification accuracy was observed, TRICOR had a larger value than MAP for 20% of the problems, BAYS had a larger value than MAP for 25% of the problems and BAYS had a larger value than TRICOR for 54% of the problems. When evaluating the importance of these results, consideration should be given to the facts that no difference in classification accuracy was observed for a large number of problems, and none of the methodologies exhibited classification accuracy results consistently higher than the base rate.

VI. COMPARISON OF REQUIRED COMPUTER RESOURCES

A comparison of the computer resources required to perform the BAYS, MAP, and TRICOR computations yielded results similar to those reported for the retention/attrition study (Albert,

1980). As discussed in Sections III through V, there was little difference among the methodologies regarding classification accuracy; however, there were differences in the computer resources required to perform the computations for each methodology. Coinciding with the accomplishment of the analyses described in this report, a computerized algorithm, referred to as Likelihood Function Estimation (LIFE), which performs the same function as MAP was developed. According to the government project monitor for this effort, the LIFE algorithm (Dempsey et al., 1979) should converge more rapidly and more frequently (i.e., fail to converge for fewer problems) than the MAP algorithm, while maintaining the same degree of predictive accuracy; however, the mass storage constraints that apply to MAP also apply to LIFE. A major contributor to this purported gain in processing efficiency was the replacement of the iterative technique to solve a system of simultaneous nonlinear equations with a more efficient one (Hausman & Wise, 1976). The effects on processing time and classification accuracy of using LIFE rather than MAP have not been fully investigated; however, preliminary evidence indicates that processing time will be significantly reduced.

All of the comparisons in this section refer to the version of each computer program presently operational on the AFHRL UNIVAC 1108. The magnitude of the differences could vary depending on the computer system employed and, with additional research (as was done for the MAP algorithm), the BAYS and TRICOR computerized algorithms could be streamlined with respect to input/output (I/O) time, central processing unit (CPU) time, or mass storage required. For example, BAYS could be modified to utilize a variable packing factor for storing cases on a record, dynamic storage allocation, and computational shortcuts to decrease the number of data file passes. Although the specific results presented in this section depend on the computer system and program version employed, the comparison should still be a valuable guide for researchers who wish to estimate the computer resources required to perform the BAYS, TRICOR, MAP, or LIFE (i.e., if a relationship between MAP and LIFE processing times is derived) computations on the AFHRL UNIVAC 1108 or a similar computer system without significantly modifying the computerized algorithms.

As discussed by Albert (1980), an increase in the number of independent variables associated with a BAYS problem results in a dramatic increase in processing time. Over 80% of the total time for each BAYS run was allocated to I/O processing. An increase in the number of cases per sample resulted in a proportionate increase in total (and I/O) processing time. For the UPT study, the total times required for MAP processing were approximately 7% to 13% of the total times required to process a similar BAYS problem with the CPU times comprising approximately 86% to 96% of the total time. For the Technical Training and BMT studies, the CPU times for MAP comprised approximately 76% to 97% of the total time. A similar comparison of total times between MAP and BAYS for these two studies was not straightforward because in each run the BAYS computerized algorithm solved three problems—corresponding to the three variable sets for each combination of AFSC and sample size or base rate and sample size. The problems were "stacked" to minimize the computer resources required for this effort. Summing the total times for the three MAP runs corresponding to each BAYS run shows that the total time required for MAP processing was less than 10% of the total time required to process three similar BAYS problems, with the CPU time comprising approximately 85% to 94% of the total time. In addition, a direct comparison of TRICOR processing times with MAP and BAYS processing times was not straightforward since each TRICOR run performed both the SLS and OLS computations on the same problem groupings as previously described for the BAYS algorithm; however, comparisons will still be made to point out a general pattern of computer resource requirements. The total times required for TRICOR processing were less than 20% of the total times required to process a similar BAYS problem with the CPU time and I/O time comprising approximately 9 to 17% and 63% to 77% of the total time, respectively.

As mentioned earlier, examination of the computer resources required for analysis of the Technical Training, BMT and UPT data files by each statistical algorithm yields results similar to those of Albert (1980). The I/O time required for MAP computations is small in relation to the total

time since a large amount of information is retained in mass storage, necessitating little file handling; however, mass storage constraints severely restrict the size of problems acceptable for MAP solution. An increase in the number of independent variables associated with a MAP problem causes a corresponding decrease in the maximum number of cases allowable for analysis. In addition, as the number of independent variables increases, the processing time associated with a MAP run increases more rapidly than the processing time associated with a TRICOR run. Most of this increase is due to a large increase in CPU time. Therefore, it appears that the TRICOR algorithm becomes more efficient than the MAP algorithm with respect to total time required as the number of independent variables increase. The I/O times presently required to process BAYS problems limit the use of this methodology to the solution of smaller problems than could be processed by the TRICOR or MAP algorithms. Consequently, for problems involving a large number of cases and independent variables, the TRICOR algorithm may provide the only solution within acceptable time and mass storage constraints.

VII. SUMMARY AND RECOMMENDATIONS

In order to fulfill the requirements for RPR 77-14, the abilities of the MAP, BAYS, and TRICOR algorithms to correctly classify individuals as graduates or nongraduates from several Air Force training programs were compared. These programs included Technical Training, BMT, and UPT. Albert (1980) has documented the research that implements the MAP computer program on the AFHRL UNIVAC 1108 computer system and has compared the predictive efficiencies of the MAP, BAYS, and TRICOR algorithms in classifying airmen as normal dischargees (including active duty status) or involuntary dischargees. A major difference between the current and past efforts is that the test design for the Technical Training, BMT, and UPT studies required the cross-validation samples to be randomly selected from personnel who entered training in a time frame subsequent to the one serving as a data base for creation of the validation samples. However, the test design for the attrition/retention study by Albert (1980) required the validation and cross-validation samples to be randomly selected from the same time frame. The time frames selected for each of the current studies corresponded to the most recent data base available from the AFHRL master files. The design of these studies more closely simulates a real-world prediction problem in that data from one time period are used to develop a model for prediction into the next time period.

All of the information required to create a data base for the Technical Training, BMT, and UPT studies was available in AFHRL master files; however, creation of program compatible data files was time consuming. The Technical Training population consisted of 17,562 airmen who entered training in 1976 and 1977 for AFSCs 43131, 46230, 64530 or 81130. For each AFSC, several subsets of the following variables and/or transformations of the variables were selected for development of predictive models by each methodology: (a) scores from the aptitude tests (Administrative, Mechanical, Electrical, and General) of the ASVAB, (b) AFQT score, (c) PDA score, (d) 0/1 score denoting number of years required to reach highest level of education less than 12/greater than or equal to 12, (e) PEI score, (f) age in years at enlistment, and (g) high school completion of algebra, biology, business mathematics, chemistry, general science, geometry, journalism, photography, physics, trigonometry, English, general business, driver training, home economics, statistics, general mathematics, and shop mathematics. In general, random samples of 500 and 1,000 cases were drawn without replacement for each combination of AFSC and year entered training with the requirement that each sample contain the same percentage of graduates as the population from which it was drawn.

The BMT population consisted of 60,766 airmen who entered training in 1976 and 1977. Three subsets of the independent variables used in the Technical Training study were selected for development of predictive models by each methodology. To examine the classification accuracies of the statistical methodologies in a variety of problem settings, samples were constructed so that all possible combinations of three sample sizes (500, 1,000, and 2,000 cases) and base rates (90% , 95% , and 98%) could be analyzed for each set of independent variables.

The UPT population consisted of 6,191 individuals enrolled in pilot training in FY74 to FY78. The following variables were selected for development of predictive models by each methodology: (a) navigator, officer, and pilot scores from the AFOQT, (b) age in years at entrance to UPT, (c) 0/1 score denoting months of total active Federal military service less than 12/greater than or equal to 12, (d) 0/1 score denoting nontechnical/technical bachelor degree specialty, (e) 0/1 score denoting single/married, and (f) 0/1 score denoting OTS/ROTC graduate. Several combinations of validation/cross-validation data sets were constructed where each validation or cross-validation sample included all trainees in the population who enrolled in UPT during the fiscal year(s) encompassed by that particular sample.

The classification accuracies and computer resource requirements associated with the application of each statistical methodology to a variety of Technical Training, BMT, and UPT binary prediction problems were compared resulting in several general conclusions. As in the retention/attrition study by Albert (1980), there was little difference among the methodologies in their ability to classify individuals correctly. In addition, none of the methodologies yielded classification accuracy results consistently higher than the base rate. All comparisons of classification accuracy among the MAP, BAYS, and least squares methodologies are based on the OLS results. OLS was chosen as the representative methodology of the least squares technique since the SLS classification accuracies were so similar to the OLS classification accuracies and the number of operations required to perform the OLS option is less than the number required for SLS. The inclusion of AID-4 identified interaction terms in the model-building process did not yield a large enough increase in classification accuracy to justify the development of a more complicated model.

Convergence difficulties were encountered during the MAP analyses; therefore, a comparison of predictive efficiencies among the methodologies did not exist for all problems. Although the classification accuracy results were similar, there were differences in the computer resources required to process the data for each methodology. These differences were similar to those observed for the retention/attrition study (Albert, 1980). For all analyses, the total time required to process a group of BAYS problems was appreciably longer than the total time required to process a similar group of MAP or TRICOR problems, primarily because of the large amount of I/O time associated with performing the BAYS computations. If a proposed modification to the BAYS algorithm is implemented, the I/O time required for processing a BAYS problem could be greatly reduced; however, the total times associated with the BAYS problems still would greatly surpass the times for similar MAP or TRICOR problems. Since a large amount of information is retained in mass storage necessitating little file handling, the I/O time required for a MAP problem is small in relation to the total time; however, the CPU time required, which increases rather rapidly as the number of independent variables increases, is large in relation to the total time. As discussed in the previous section, a computer program (LIFE) has been developed to replace MAP. The LIFE program seems to offer a reduction in processing time for MAP-type analyses, while maintaining the same level of predictive accuracy. Results regarding the comparison of computer resources should be extended to the LIFE algorithm by deriving a relationship between MAP and LIFE processing times. Due to mass storage constraints which severely restrict the size of problems acceptable for MAP solution, it is especially important with MAP, as it is desirable for other methodologies, to employ an efficient variable selection technique.

If the number of cases and independent variables associated with a particular problem is large, the efficient data-handling capabilities of the TRICOR algorithm assume added significance; in fact, TRICOR may be the only method of the three to obtain a solution within acceptable time and mass storage constraints.

If one of these methodologies is to be used repeatedly as an operational tool to solve the type of problem investigated in this report, an effort should be initiated to tailor the identified algorithm to the specific requirements of that application.

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APPENDIX A: CHARACTERISTICS OF THE TECHNICAL TRAINING, BASIC MILITARY TRAINING, AND UNDERGRADUATE PILOT TRAINING POPULATIONS

Table A1. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1976 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	26	0.8
20-29	241	7.0
30-39	336	9.8
40-49	624	18.2
50-59	662	19.3
60-69	592	17.3
70-79	482	14.0
80-89	272	7.9
90-99	196	5.7

Table A2. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1976 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<60	631	18.4
60-69	713	20.8
70-79	568	16.6
80-89	776	22.6
90-99	743	21.7

Table A3. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1976 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	25	0.7
30-39	67	2.0
40-49	246	7.2
50-59	433	12.6
60-69	737	21.5
70-79	780	22.7
80-89	610	17.8
90-99	533	15.5

Table A4. **Distribution of the ASVAB General Aptitude Test Scores for the 1976 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	346	10.1
50-59	683	19.9
60-69	778	22.7
70-79	675	19.7
80-89	483	14.1
90-99	466	13.6

Table A5. **Distribution of the AFQT Scores for the 1976 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	16	0.5
30-39	221	6.4
40-49	395	11.5
50-59	690	20.1
60-69	762	22.2
70-79	601	17.5
80-89	483	14.1
90-99	263	7.7

Table A6. **Distribution of the PDA Scores for the 1976 AFSC 43131 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	1,180	34.4
3-5	1,227	35.8
6-8	667	19.4
9-11	247	7.2
12-14	79	2.3
15-17	28	0.8
18-20	2	0.0
21-23	1	0.0

Table A7. **Distribution of Age at Enlistment for the 1976 AFSC 43131 Population**

Age (Years)	Number	Percent
17	40	1.2
18	571	16.6
19	1,268	37.0
20	654	19.1
21	384	11.2
22	230	6.7
23	118	3.4
⩾24	166	4.8

Table A8. **Distribution of the PEI Scores for the 1976 AFSC 43131 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-1	1,766	51.5
2-3	1,136	33.1
4-5	369	10.8
6-7	119	3.5
8-9	30	0.9
10-11	9	0.3
12-13	1	0.0
>13	1	0.0

Table A9. **Distribution of Education for the 1976 AFSC 43131 Population**

1		0	
Number	Percent	Number	Percent
3,212	93.6	219	6.4

Table A10. **Distribution of Completion/Incompletion of High School Courses for the 1976 AFSC 43131 Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	2,479	72.3	952	27.7
Biology	2,516	73.3	915	26.7
Business Math	633	18.4	2,798	71.6
Chemistry	844	24.6	2,587	75.4
General Science	2,862	83.4	569	16.6
Geometry	1,614	47.0	1,817	53.0
Journalism	318	9.3	3,113	90.7
Photography	111	3.2	3,320	96.8
Physics	507	14.8	2,924	85.2
Trigonometry	458	13.3	2,973	86.7
English	3,242	94.5	189	5.5
General Business	725	21.1	2,706	78.9
Driver Training	2,752	80.2	679	19.8
Home Economics	1,292	37.7	2,139	62.3
Statistics	85	2.5	3,346	97.5
General Math	2,960	86.3	471	13.7
Shop Math	1,137	33.1	2,294	66.9

Table A11. **Means and Standard Deviations of the Independent Variables for the 1976 AFSC 43131 Population**

Independent Variable	Mean	SD
Mechanical	73.40	14.40
Administrative	55.44	18.87
General	67.59	14.94
Electrical	69.41	15.95
AFQT	65.08	16.23
Education	.94	.24
Algebra	.72	.45
Biology	.73	.44
Business Math	.18	.39
Chemistry	.25	.43
General Science	.83	.37
Geometry	.47	.50
Journalism	.09	.29
Photography	.03	.18
Physics	.15	.35
Trigonometry	.13	.34
English	.94	.23
General Business	.21	.41
Driver Training	.80	.40
Home Economics	.38	.48
Statistics	.02	.16
General Math	.86	.34
Shop Math	.33	.47
Age	19.85	1.75
PEI	1.85	1.82
PDA	4.28	3.17

Table A12. Correlation Matrix of the Independent Variables for the

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Journ	Photo
Mechanical	1.00	.05	.23	.49	.35	-.06	.04	-.02	-.08	.02	.00	.05	.01	-.03
Administrative		1.00	.48	.23	.43	.01	.21	.11	.00	.19	.03	.23	.03	.03
General			1.00	.51	.80	-.10	.22	.12	.00	.24	.00	.25	.03	.05
Electrical				1.00	.76	-.12	.20	.04	-.05	.19	-.01	.23	.03	.03
AFQT					1.00	-.17	.22	.10	-.02	.22	-.01	.25	.04	.05
Education						1.00	.08	.10	.01	.09	.07	.10	.03	.01
Algebra							1.00	.25	-.01	.28	.07	.51	.05	.06
Biology								1.00	.02	.22	.04	.24	.06	.09
Business Math									1.00	-.05	.08	-.03	.05	.01
Chemistry										1.00	.03	.39	.04	.09
General Science											1.00	.05	.06	.04
Geometry												1.00	.07	.08
Journalism													1.00	.05
Photography														1.00
Physics														
Trigonometry														
English														
General Business														
Driver Training														
Home Economics														
Statistics														
General Math														
Shop Math														
Age														
PEI														
PDA														

les for the 1976 AFSC 43131 Population

Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
-.03	.07	.05	-.01	-.05	.08	-.08	.02	-.02	.15	.04	-.01	.04
.03	.12	.18	.07	.02	.04	.11	.07	.00	-.03	.09	-.08	-.12
.05	.17	.24	.04	-.02	.03	.03	.07	-.01	-.03	.14	.00	-.02
.03	.18	.20	.00	-.06	.07	-.01	.07	-.01	.09	.06	-.03	-.01
.05	.18	.24	.02	-.04	.06	.04	.08	-.01	.01	.09	-.02	-.02
.01	.04	.07	.15	.01	.10	.01	.02	.03	-.01	.12	-.06	-.20
.06	.17	.23	.16	-.03	.07	.03	.07	-.07	.08	-.02	-.08	-.14
.09	.09	.10	.19	.01	.06	.05	.04	.01	-.03	.03	-.04	-.12
.01	-.02	-.05	.03	.27	.00	.06	.14	.08	.10	.07	.00	-.02
.09	.38	.38	.07	-.05	.02	.00	.14	.02	.02	.08	-.03	-.13
.04	.02	.02	.18	.05	.02	.05	.03	.24	.07	.06	-.01	-.03
.08	.27	.38	.13	-.08	.04	.00	.09	.00	.07	.02	-.08	-.15
.05	.02	.02	.04	.04	.04	.06	.08	.04	.01	-.04	-.01	-.04
1.00	.04	.04	.02	.02	.02	.05	.07	.03	.01	.02	-.01	-.04
	1.00	.38	.06	-.06	.02	-.03	.16	.03	.06	.05	-.03	-.09
		1.00	.07	-.05	-.01	-.03	.15	.09	.05	.04	-.03	-.11
			1.00	.04	.09	.06	.04	.11	.03	.00	-.02	-.06
				1.00	.00	.10	.11	.05	.04	.06	.00	-.03
					1.00	.03	.02	.03	.03	-.04	-.03	-.08
						1.00	.07	.07	.08	.04	-.02	-.05
							1.00	.02	.07	.08	-.01	-.05
								1.00	.08	.05	-.01	-.03
									1.00	.01	-.05	-.03
										1.00	.02	-.12
											1.00	.56
												1.00

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Table A13. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1977 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	38	0.8
20-29	200	4.0
30-39	430	8.7
40-49	566	11.4
50-59	839	17.0
60-69	1,020	20.6
70-79	730	14.8
80-89	653	13.2
90-99	470	9.5

Table A14. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1977 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<60	920	18.6
60-69	791	16.0
70-79	826	16.7
80-89	1,286	26.0
90-99	1,123	22.7

Table A15. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1977 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	29	0.6
30-39	130	2.6
40-49	254	5.1
50-59	432	8.7
60-69	842	17.0
70-79	1,041	21.0
80-89	1,144	23.1
90-99	1,074	21.7

Table A16. **Distribution of the ASVAB General Aptitude Test Scores for the 1977 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	304	6.1
50-59	737	14.9
60-69	971	19.6
70-79	1,008	20.4
80-89	954	19.3
90-99	972	19.7

Table A17. **Distribution of the AFQT Scores for the 1977 AFSC 43131 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	5	0.1
30-39	131	2.6
40-49	738	14.9
50-59	1,056	21.4
60-69	1,183	23.9
70-79	758	15.3
80-89	637	12.9
90-99	438	8.9

Table A18. **Distribution of the PDA Scores for the 1977 AFSC 43131 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	1,396	28.2
3-5	1,783	36.0
6-8	1,034	20.9
9-11	478	9.7
12-14	182	3.7
15-17	57	1.2
18-20	15	0.3
21-23	1	0.0

Table A19. **Distribution of Age at Enlistment for the 1977 AFSC 43131 Population**

Age (Years)	Number	Percent
17	76	1.5
18	1,238	25.0
19	1,759	35.6
20	823	16.6
21	420	8.5
22	261	5.3
23	148	3.0
≥24	221	4.5

Table A20. **Distribution of the PEI Scores for the 1977 AFSC 43131 Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	2,121	42.9
2-3	1,673	33.8
4-5	756	15.3
6-7	271	5.5
8-9	89	1.8
10-11	25	0.5
12-13	9	0.2
>13	2	0.0

Table A21. **Distribution of Education for the 1977 AFSC 43131 Population**

1		0	
Number	Percent	Number	Percent
4,660	94.2	286	5.8

Table A22. **Distribution of Completion/Incompletion of High School Courses for the 1977 AFSC 43131 Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	3,691	74.6	1,255	25.4
Biology	3,683	74.5	1,263	25.5
Business Math	930	18.8	4,016	81.2
Chemistry	1,264	25.6	3,682	74.4
General Science	4,107	83.0	839	17.0
Geometry	2,344	47.4	2,602	52.6
Journalism	539	10.9	4,407	89.1
Photography	157	3.2	4,789	96.8
Physics	707	14.3	4,239	85.7
Trigonometry	744	15.0	4,202	85.0
English	4,709	95.2	237	4.8
General Business	962	19.5	3,984	80.5
Driver Training	3,999	80.9	947	19.1
Home Economics	1,520	30.7	3,426	69.3
Statistics	128	2.6	4,818	97.4
General Math	4,163	84.2	783	15.8
Shop Math	1,104	22.3	3,842	77.7

Table A23. **Means and Standard Deviations of the Independent Variables for the 1977 AFSC 43131 Population**

Independent Variable	Mean	SD
Mechanical	74.21	14.38
Administrative	60.83	19.18
General	71.61	14.71
Electrical	72.69	16.05
AFQT	65.46	15.50
Education	.94	.23
Algebra	.75	.44
Biology	.74	.44
Business Math	.19	.39
Chemistry	.26	.44
General Science	.83	.38
Geometry	.47	.50
Journalism	.11	.31
Photography	.03	.18
Physics	.14	.35
Trigonometry	.15	.36
English	.95	.21
General Business	.19	.40
Driver Training	.81	.39
Home Economics	.31	.46
Statistics	.03	.16
General Math	.84	.37
Shop Math	.22	.42
Age	19.60	1.76
PEI	2.31	2.09
PDA	4.87	3.49

Table A24. **Correlation Matrix of the Independent Variables**

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Journ
Mechanical	1.00	.12	.33	.52	.39	-.08	.03	-.04	-.05	.04	.00	.07	-.03
Administrative		1.00	.53	.30	.44	-.02	.26	.12	-.05	.21	.05	.27	.03
General			1.00	.56	.81	-.13	.23	.08	-.03	.18	.02	.27	.02
Electrical				1.00	.71	-.15	.16	-.01	-.04	.14	.01	.23	-.02
AFQT					1.00	-.17	.21	.05	-.07	.19	.00	.27	.02
Education						1.00	.08	.08	.03	.05	.02	.05	.00
Algebra							1.00	.22	-.07	.25	.03	.48	.05
Biology								1.00	.03	.18	.01	.19	.04
Business Math									1.00	-.05	.08	-.09	.06
Chemistry										1.00	.03	.37	.05
General Science											1.00	.01	.05
Geometry												1.00	.06
Journalism													1.00
Photography													
Physics													
Trigonometry													
English													
General Business													
Driver Training													
Home Economics													
Statistics													
General Math													
Shop Math													
Age													
PEI													
PDA													

iables for the 1977 AFSC 43131 Population

[illegible]	Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
-.03	-.02	.08	.04	.01	-.08	.09	-.10	-.01	.03	.13	.05	.00	.04
.03	.06	.13	.22	.07	-.01	.04	.07	.05	-.01	-.02	.05	-.08	-.09
.02	.03	.14	.22	.06	-.02	.04	.02	.06	-.04	.00	.14	-.05	-.04
-.02	-.01	.17	.17	.02	-.05	.04	-.05	.03	-.01	.09	.07	-.03	-.04
.02	.02	.16	.22	.04	-.03	.04	.01	.05	-.03	.01	.10	-.03	-.04
.00	.02	.04	.05	.09	.03	.06	.01	.00	.02	.01	.08	-.02	-.14
.05	.04	.17	.23	.12	-.04	.04	-.01	.05	-.11	.01	-.01	-.09	-.15
.04	.08	.06	.09	.14	.00	.02	.03	.03	-.01	-.04	.02	-.05	-.10
.06	.04	-.02	-.07	.04	.21	.02	.06	.09	.10	.09	.06	.05	.04
.05	.11	.36	.35	.06	-.04	.02	-.01	.11	.00	.01	.03	-.08	-.15
.05	.05	.02	.04	.14	.06	-.01	.04	.04	.25	.06	.09	-.03	-.02
.06	.07	.27	.40	.09	-.05	.04	-.03	.09	-.01	.02	.04	-.10	-.17
1.00	.04	.02	.02	.05	.04	.03	.08	.08	.05	.02	-.03	.00	-.01
	1.00	.07	.06	.01	.04	.01	.03	.08	.02	.01	.07	-.03	-.05
		1.00	.38	.03	.00	-.01	-.04	.11	.03	.07	.09	-.04	-.12
			1.00	.04	-.04	.01	-.01	.16	.08	.06	.08	-.07	-.15
				1.00	.01	.09	.06	.02	.08	.04	-.02	-.03	-.06
					1.00	.04	.10	.12	.05	.04	.05	.02	-.02
						1.00	.07	.00	.00	.01	-.04	-.01	-.03
							1.00	.06	.04	.06	-.01	.02	-.01
								1.00	.04	.07	.08	-.04	-.04
									1.00	.11	.06	.00	.00
										1.00	.05	-.02	.00
											1.00	.02	-.10
												1.00	.61
													1.00

Table A25. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1976 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	8	1.0
20-29	51	6.1
30-39	94	11.3
40-49	129	15.5
50-59	162	19.5
60-69	155	18.6
70-79	115	13.8
80-89	74	8.9
90-99	44	5.3

Table A26. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1976 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	2	0.2
20-29	2	0.2
30-39	13	1.6
40-49	21	2.5
50-59	46	5.5
60-69	192	23.1
70-79	158	19.0
80-89	206	24.8
90-99	192	23.1

Table A27. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1976 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	5	0.6
30-39	10	1.2
40-49	30	3.6
50-59	89	10.7
60-69	176	21.2
70-79	202	24.3
80-89	164	19.7
90-99	156	18.6

Table A28. **Distribution of the ASVAB General Aptitude Test Scores for the 1976 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	65	7.8
50-59	164	19.7
60-69	211	25.4
70-79	144	17.3
80-89	124	14.9
90-99	124	14.9

Table A29. **Distribution of the AFQT Scores for the 1976 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	4	0.5
30-39	26	3.1
40-49	114	13.7
50-59	145	17.4
60-69	196	23.6
70-79	144	17.3
80-89	124	14.9
90-99	79	9.5

Table A30. **Distribution of the PDA Scores for the 1976 AFSC 46230 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	335	40.3
3-5	337	40.5
6-8	116	13.9
9-11	38	4.6
12-14	4	0.5
15-17	2	0.2

Table A31. **Distribution of Age at Enlistment for the 1976 AFSC 46230 Population**

Age (Years)	Number	Percent
17	12	1.4
18	141	16.9
19	318	38.2
20	161	19.4
21	100	12.0
22	51	6.1
23	25	3.0
≥24	24	2.9

Table A32. **Distribution of the PEI Scores for the 1976 AFSC 46230 Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	506	60.8
2-3	246	29.6
4-5	64	7.7
6-7	12	1.4
8-9	4	0.5

Table A33. **Distribution of Education for the 1976 AFSC 46230 Population**

1		0	
Number	Percent	Number	Percent
831	99.9	1	0.1

Table A34. **Distribution of Completion/Incompletion of High School Courses for the 1976 AFSC 46230 Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	604	72.6	228	27.4
Biology	628	75.5	204	24.5
Business Math	167	20.1	665	79.9
Chemistry	201	24.2	631	75.8
General Science	719	86.4	113	13.6
Geometry	370	44.5	462	55.5
Journalism	89	10.7	743	89.3
Photography	35	4.2	797	95.8
Physics	96	11.5	736	88.5
Trigonometry	112	13.5	720	86.5
English	796	95.7	36	4.3
General Business	159	19.1	673	80.9
Driver Training	679	81.6	153	18.4
Home Economics	278	33.4	554	66.6
Statistics	23	2.8	809	97.2
General Math	730	87.7	102	12.3
Shop Math	302	36.3	530	63.7

Table A35. **Means and Standard Deviations of the Independent Variables for the 1976 AFSC 46230 Population**

Independent Variable	Mean	SD
Mechanical	74.44	14.92
Administrative	55.55	18.75
General	68.46	14.79
Electrical	72.17	14.83
AFQT	66.59	16.07
Education	1.00	.03
Algebra	.73	.45
Biology	.75	.43
Business Math	.20	.40
Chemistry	.24	.43
General Science	.86	.34
Geometry	.44	.50
Journalism	.11	.31
Photography	.04	.20
Physics	.12	.32
Trigonometry	.13	.34
English	.96	.20
General Business	.19	.39
Driver Training	.82	.39
Home Economics	.33	.47
Statistics	.03	.16
General Math	.88	.33
Shop Math	.36	.48
Age	19.71	1.56
PEI	1.49	1.50
PDA	3.51	2.57

Table A36. **Correlation Matrix of the Independent Variables for the 1**

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Journ	Pho
Mechanical	1.00	.15	.30	.39	.35	-.01	.03	-.02	-.05	.04	.01	.04	.00	[illegible]
Administrative		1.00	.47	.30	.44	.01	.22	.05	.05	.21	.06	.30	.07	[illegible]
General			1.00	.56	.82	-.06	.23	.10	-.01	.24	.08	.29	.07	[illegible]
Electrical				1.00	.78	-.03	.20	.02	-.08	.19	-.01	.26	.03	[illegible]
AFQT					1.00	-.05	.22	.08	-.04	.22	.04	.30	.06	[illegible]
Education						1.00	-.02	-.02	.02	.02	-.01	.03	.01	[illegible]
Algebra							1.00	.20	.02	.24	.05	.47	.09	[illegible]
Biology								1.00	.06	.19	-.01	.18	.08	[illegible]
Business Math									1.00	-.05	-.02	.01	.07	[illegible]
Chemistry										1.00	.04	.34	.06	[illegible]
General Science											1.00	.03	.06	[illegible]
Geometry												1.00	.07	[illegible]
Journalism													1.00	[illegible]
Photography														1.0
Physics														
Trigonometry														
English														
General Business														
Driver Training														
Home Economics														
Statistics														
General Math														
Shop Math														
Age														
PEI														
PDA														

es for the 1976 AFSC 46230 Population

Journ	Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
.00	.02	.01	.05	-.02	.00	.12	.08	-.01	-.04	.14	.12	-.01	-.01
.07	.06	.14	.24	.11	-.07	.00	.00	.12	.02	-.02	.07	-.07	-.08
.07	.07	.14	.26	.09	-.10	.05	.02	.07	-.04	-.01	.11	-.09	-.06
.03	.04	.13	.23	.01	-.13	.04	.03	.05	.00	.08	.05	-.02	-.07
.06	.04	.15	.26	.04	-.12	.03	.03	.07	-.03	.03	.09	-.08	-.09
.01	.01	.01	.01	-.01	.02	-.02	-.05	.01	-.01	-.05	.02	.03	.01
.09	.10	.15	.23	.12	-.07	.19	.03	.07	-.08	.08	-.04	-.07	-.11
.08	.11	.09	.13	.14	.02	.07	.05	.06	.00	-.06	.09	-.04	-.05
.07	.01	-.07	-.05	.00	.21	.01	-.01	.10	.00	.10	.06	-.04	-.04
.06	.16	.37	.36	.08	-.08	.02	.00	.14	-.01	-.04	.06	-.04	-.13
.06	.08	.04	.01	.21	.03	-.03	.09	.02	.23	.08	.06	-.02	-.02
.07	.11	.20	.41	.08	-.06	.04	.03	.11	.03	.07	.03	-.09	-.12
1.00	.06	.05	.05	.04	.08	.00	.14	.11	.01	.05	-.02	-.01	-.02
	1.00	.02	.11	.04	.02	.04	.08	.04	-.01	.00	.02	.01	-.05
		1.00	.34	.08	-.07	-.01	.00	.15	.04	.08	.04	-.04	-.08
			1.00	.07	-.09	.01	-.03	.11	.06	.05	.07	-.05	-.13
				1.00	.06	-.01	.08	.04	.06	.05	-.01	-.12	-.02
					1.00	-.01	.03	.12	.05	.02	.10	.00	.04
						1.00	.05	-.07	-.07	.06	.00	.00	.04
							1.00	.07	-.04	.18	-.04	.00	.01
								1.00	.06	.09	.01	.01	-.03
									1.00	.07	.06	.01	.01
										1.00	.00	-.06	-.09
											1.00	.01	-.12
												1.00	.51
													1.00

2

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Table A37. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1977 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	9	0.5
20-29	66	3.4
30-39	163	8.3
40-49	172	8.8
50-59	300	15.3
60-69	445	22.8
70-79	308	15.7
80-89	278	14.2
90-99	215	11.0

Table A38. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1977 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	3	0.2
20-29	6	0.3
30-39	33	1.7
40-49	40	2.0
50-59	69	3.5
60-69	361	18.5
70-79	377	19.3
80-89	567	29.0
90-99	500	25.6

Table A39. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1977 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	5	0.3
30-39	24	1.2
40-49	62	3.2
50-59	99	5.1
60-69	275	14.1
70-79	362	18.5
80-89	561	28.7
90-99	568	29.0

Table A40. **Distribution of the ASVAB General Aptitude Test Scores for the 1977 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	88	4.5
50-59	269	13.8
60-69	353	18.0
70-79	390	19.9
80-89	396	20.2
90-99	460	23.5

Table A41. **Distribution of the AFQT Scores for the 1977 AFSC 46230 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	1	0.1
30-39	34	1.7
40-49	234	12.0
50-59	437	22.3
60-69	491	25.1
70-79	303	15.5
80-89	262	13.4
90-99	194	9.9

Table A42. **Distribution of the PDA Scores for the 1977 AFSC 46230 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	630	32.2
3-5	696	35.6
6-8	418	21.4
9-11	145	7.4
12-14	53	2.7
15-17	10	0.5
18-20	4	0.2

Table A43. **Distribution of Age at Enlistment for the 1977 AFSC 46230 Population**

Age (Years)	Number	Percent
17	32	1.6
18	457	23.4
19	702	35.9
20	335	17.1
21	196	10.0
22	97	5.0
23	64	3.3
≥24	73	3.7

Table A44. **Distribution of the PEI Scores for the 1977 AFSC 46230 Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	928	47.4
2-3	626	32.0
4-5	259	13.2
6-7	99	5.1
8-9	31	1.6
10-11	10	0.5
12-13	3	0.2

Table A45. **Distribution of Education for the 1977 AFSC 46230 Population**

1		0	
Number	Percent	Number	Percent
1,935	98.9	21	1.1

Table A46. **Distribution of Completion/Incompletion of High School Courses for the 1977 AFSC 46230 Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	1,531	78.3	425	21.7
Biology	1,477	75.5	479	24.5
Business Math	392	20.0	1,564	80.0
Chemistry	569	29.1	1,387	70.9
General Science	1,621	82.9	335	17.1
Geometry	962	49.2	994	50.8
Journalism	237	12.1	1,719	87.9
Photography	61	3.1	1,895	96.9
Physics	325	16.6	1,631	83.4
Trigonometry	362	18.5	1,594	81.5
English	1,877	96.0	79	4.0
General Business	339	17.3	1,617	82.7
Driver Training	1,607	82.2	349	17.8
Home Economics	562	28.7	1,394	71.3
Statistics	73	3.7	1,883	96.3
General Math	1,654	84.6	302	15.4
Shop Math	468	23.9	1,488	76.1

Table A47. **Means and Standard Deviations of the Independent Variables for the 1977 AFSC 46230 Population**

Independent Variable	Mean	SD
Mechanical	76.36	14.43
Administrative	62.83	18.90
General	73.39	14.67
Electrical	76.88	14.32
AFQT	66.68	15.20
Education	.99	.10
Algebra	.78	.41
Biology	.76	.43
Business Math	.20	.40
Chemistry	.29	.45
General Science	.83	.38
Geometry	.49	.50
Journalism	.12	.33
Photography	.03	.17
Physics	.17	.37
Trigonometry	.19	.39
English	.96	.20
General Business	.17	.38
Driver Training	.82	.38
Home Economics	.29	.45
Statistics	.04	.19
General Math	.85	.36
Shop Math	.24	.43
Age	19.60	1.67
PEI	2.14	2.03
PDA	4.41	3.21

Table A48. **Correlation Matrix of the Independent Variable[illegible]**

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Jo[illegible]
Mechanical	1.00	.14	.30	.41	.35	-.03	.06	.01	-.07	.01	.01	.06	-.[illegible]
Administrative		1.00	.54	.31	.46	.00	.26	.11	.00	.24	.01	.32	.[illegible]
General			1.00	.57	.83	-.07	.26	.11	-.01	.27	.03	.33	.[illegible]
Electrical				1.00	.72	-.04	.25	.05	-.02	.21	.01	.29	.[illegible]
AFQT					1.00	-.08	.27	.10	-.01	.29	.01	.35	.[illegible]
Education						1.00	.05	.03	.04	.02	.03	.01	.0[illegible]
Algebra							1.00	.22	-.07	.25	.01	.46	.0[illegible]
Biology								1.00	.01	.17	.03	.19	.0[illegible]
Business Math									1.00	-.06	.10	-.07	.1[illegible]
Chemistry										1.00	.03	.39	.0[illegible]
General Science											1.00	.00	.0[illegible]
Geometry												1.00	.0[illegible]
Journalism													1.0[illegible]
Photography													
Physics													
Trigonometry													
English													
General Business													
Driver Training													
Home Economics													
Statistics													
General Math													
Shop Math													
Age													
PEI													
PDA													

ariables for the 1977 AFSC 46230 Population

Journ	Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
-.02	.02	.06	.06	.00	-.05	.08	-.03	.03	.02	.13	.12	.02	.04
.02	.03	.21	.28	.08	.00	.02	.01	.10	-.01	.01	.10	-.09	-.08
.05	.03	.21	.27	.08	-.03	.04	-.04	.08	.00	.02	.18	-.01	-.01
.06	.01	.20	.24	.05	-.06	.04	-.04	.04	.00	.06	.13	.01	-.04
.08	.03	.22	.28	.08	-.06	.05	-.04	.08	.02	.02	.16	-.01	-.05
.04	-.01	.05	.04	.00	.01	.07	.00	.02	-.03	-.01	.02	-.04	-.12
.07	.04	.18	.24	.11	-.06	.00	.07	.06	-.09	.00	-.03	-.12	-.15
.09	.04	.06	.08	.14	-.01	-.02	.04	.06	.01	-.05	.04	-.04	-.07
.10	.04	-.06	-.05	.01	.26	.05	.07	.13	.05	.05	.05	.04	.01
.03	.07	.38	.40	.07	-.04	.04	.00	.16	.01	.00	.05	-.07	-.15
.06	.02	.01	.01	.07	.03	.03	.04	.06	.26	.11	.05	.01	.00
.03	.05	.33	.42	.10	-.05	.07	.01	.12	-.01	.02	.05	-.08	-.13
1.00	.01	.01	-.03	.03	.01	.05	.08	.06	.03	.02	-.04	-.02	-.04
	1.00	.01	.04	.01	.00	.03	.03	.04	.01	.03	.03	-.01	-.06
		1.00	.46	.08	-.06	.04	-.03	.15	.02	.09	.07	-.02	-.09
			1.00	.05	-.05	.06	-.02	.20	.06	.06	.06	-.07	-.14
				1.00	.02	.07	.03	.03	.06	-.02	-.05	-.02	.04
					1.00	.06	.06	.07	.03	.01	.05	.00	-.02
						1.00	.07	.01	-.01	.00	-.08	-.01	-.01
							1.00	.02	.01	.10	-.06	-.03	-.03
								1.00	.04	.07	.06	.01	-.01
									1.00	.09	.07	-.03	-.05
										1.00	.01	-.01	-.02
											1.00	.00	-.09
												1.00	.62
													1.00

Table A49. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1976 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	4	0.3
20-29	14	1.1
30-39	38	3.0
40-49	76	6.0
50-59	105	8.2
60-69	336	26.4
70-79	374	29.3
80-89	183	14.4
90-99	145	11.4

Table A50. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1976 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	130	10.2
20-29	172	13.5
30-39	207	16.2
40-49	154	12.1
50-59	183	14.4
60-69	141	11.1
70-79	116	9.1
80-89	112	8.8
90-99	60	4.7

Table A51. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1976 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	36	2.8
30-39	73	5.7
40-49	200	15.7
50-59	216	16.9
60-69	267	20.9
70-79	217	17.0
80-89	162	12.7
90-99	104	8.2

Table A52. **Distribution of the ASVAB General Aptitude Test Scores for the 1976 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	73	5.7
50-59	175	13.7
60-69	318	24.9
70-79	273	21.4
80-89	214	16.8
90-99	222	17.4

Table A53. **Distribution of the AFQT Scores for the 1976 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	1	0.1
30-39	104	8.2
40-49	159	12.5
50-59	240	18.8
60-69	292	22.9
70-79	218	17.1
80-89	165	12.9
90-99	96	7.5

Table A54. **Distribution of the PDA Scores for the 1976 AFSC 64530 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	574	45.0
3-5	433	34.0
6-8	194	15.2
9-11	56	4.4
12-14	15	1.2
15-17	2	0.2
18-20	0	0.0
21-23	1	0.1

Table A55. **Distribution of Age at Enlistment for the 1976 AFSC 64530 Population**

Age (Years)	Number	Percent
17	12	0.9
18	173	13.6
19	402	31.5
20	250	19.6
21	157	12.3
22	112	8.8
23	58	4.5
≥24	111	8.7

Table A56. **Distribution of the PEI Scores for the 1976 AFSC 64530 Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	650	51.0
2-3	407	31.9
4-5	157	12.3
6-7	47	3.7
8-9	10	0.8
10-11	3	0.2
12-13	0	0.0
>13	1	0.1

Table A57. **Distribution of Education for the 1976 AFSC 64530 Population**

1		0	
Number	Percent	Number	Percent
1,229	96.4	46	3.6

Table A58. **Distribution of Completion/Incompletion of High School Courses for the 1976 AFSC 64530 Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	1,068	83.8	207	16.2
Biology	1,020	80.0	255	20.0
Business Math	425	33.3	850	66.7
Chemistry	404	31.7	871	68.3
General Science	1,095	85.9	180	14.1
Geometry	702	55.1	573	44.9
Journalism	186	14.6	1,089	85.4
Photography	47	3.7	1,228	96.3
Physics	199	15.6	1,076	84.4
Trigonometry	250	19.6	1,025	80.4
English	1,236	96.9	39	3.1
General Business	475	37.3	800	62.7
Driver Training	976	76.5	299	23.5
Home Economics	606	47.5	669	52.5
Statistics	108	8.5	1,167	91.5
General Math	1,087	85.3	188	14.7
Shop Math	290	22.7	985	77.3

Table A59. **Means and Standard Deviations of the Independent Variables for the 1976 AFSC 64530 Population**

Independent Variable	Mean	SD
Mechanical	47.42	22.93
Administrative	68.01	15.58
General	70.77	14.26
Electrical	61.32	17.70
AFQT	64.25	16.37
Education	.96	.19
Algebra	.84	.37
Biology	.80	.40
Business Math	.33	.47
Chemistry	.32	.47
General Science	.86	.35
Geometry	.55	.50
Journalism	.15	.35
Photography	.04	.19
Physics	.16	.36
Trigonometry	.20	.40
English	.97	.17
General Business	.37	.48
Driver Training	.77	.42
Home Economics	.48	.50
Statistics	.08	.28
General Math	.85	.35
Shop Math	.23	.42
Age	20.24	1.97
PEI	1.88	1.84
PDA	3.46	2.81

Table A60. **Correlation Matrix of the Independent Variabl**

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Journ
Mechanical	1.00	.03	.31	.59	.47	-.08	.03	-.05	-.04	.05	.08	.02	.00
Administrative		1.00	.19	.08	.19	.01	.12	.07	.02	.09	.03	.14	.06
General			1.00	.52	.78	-.13	.16	.12	-.01	.22	.01	.27	05
Electrical				1.00	.79	-.10	.13	.01	-.06	.16	.03	.19	.01
AFQT					1.00	-.15	.18	.08	-.03	.21	.04	.26	.02
Education						1.00	.04	.12	.04	.08	.03	.07	.00
Algebra							1.00	.21	-.05	.23	.04	.44	.08
Biology								1.00	.00	.25	-.02	.23	.08
Business Math									1.00	-.06	.08	-.06	.02
Chemistry										1.00	.00	.40	.06
General Science											1.00	.00	.01
Geometry												1.00	.07
Journalism													1.00
Photography													
Physics													
Trigonometry													
English													
General Business													
Driver Training													
Home Economics													
Statistics													
General Math													
Shop Math													
Age													
PEI													
PDA													

bles for the 1976 AFSC 64530 Population

Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
.04	.05	.07	-.06	-.03	.11	-.16	.02	.05	.29	.07	-.09	.03
-.02	.06	.10	.05	.03	.05	.05	.01	.03	.01	.01	-.01	-.05
.07	.16	.23	.04	02	.04	-.11	.13	-.01	.08	.12	.02	.04
.03	.15	.18	-.04	-.04	.04	-.14	.06	-.01	.18	.05	-.02	-.01
.08	.18	.25	.02	-.03	.03	-.11	.12	.02	.13	.08	.01	.01
-.01	.00	.04	.11	.04	.05	.01	.00	.03	-.07	.12	-.07	-.19
.01	.12	.21	.05	-.03	.02	-.04	.10	-.09	-.01	.02	-.06	-.10
.08	.12	.12	.14	-.02	.08	-.01	.10	.00	-.08	.10	-.03	-.13
-.01	-.02	-.01	.02	.33	.01	.06	.18	.11	.13	.12	-.03	-.02
.14	.32	.38	.10	-.08	.04	-.11	.16	.02	-.01	.09	-.04	-.10
.03	-.01	.01	.06	.12	.02	-.02	.07	.24	.10	.08	-.04	-.04
.08	.23	.41	.05	-.08	.08	-.12	.20	-.02	.01	.10	-.03	-.12
.06	.03	.02	.07	.04	.12	.03	.03	.03	.06	-.09	.01	-.03
1.00	.12	.11	.03	-.02	.00	-.08	09	.06	.01	.10	.00	-.02
	1.00	.35	.03	-.09	-.03	-.08	.19	.01	.04	.07	-.02	-.10
		1.00	.02	-.08	-.03	-.09	.23	.09	.05	.07	-.01	-.08
			1.00	.04	.10	.06	.04	.05	-.02	.05	-.04	-.08
				1.00	.05	.10	.17	.07	.07	.07	-.04	-.05
					1.00	.07	.04	.03	.02	-.04	-.09	-.09
						1.00	-.05	.03	.08	-.01	.01	-.03
							1.00	.09	.07	.20	-.06	-.12
								1.00	.16	.06	.00	.01
									1.00	.02	-.09	-.02
										1.00	.00	-.13
											1.00	.59
												1.00

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Table A61. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1977 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	1	0.1
30-39	3	0.2
40-49	11	0.8
50-59	22	1.5
60-69	370	25.5
70-79	311	21.4
80-89	390	26.9
90-99	342	23.6

Table A62. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1977 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	119	8.2
20-29	181	12.5
30-39	262	18.1
40-49	152	10.5
50-59	180	12.4
60-69	181	12.5
70-79	143	9.9
80-89	139	9.7
90-99	93	6.4

Table A63. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1977 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	47	3.2
30-39	122	8.4
40-49	164	11.3
50-59	211	14.6
60-69	268	18.5
70-79	246	17.0
80-89	223	15.4
90-99	169	11.7

Table A64. **Distribution of the ASVAB General Aptitude Test Scores for the 1977 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	66	4.6
50-59	191	13.2
60-69	297	20.5
70-79	337	23.2
80-89	245	16.9
90-99	314	21.7

Table A65. **Distribution of the AFQT Scores for the 1977 AFSC 64530 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	1	0.1
30-39	37	2.6
40-49	249	17.2
50-59	347	23.9
60-69	348	24.0
70-79	233	16.1
80-89	140	9.7
90-99	95	6.6

Table A66. **Distribution of the PDA Scores for the 1977 AFSC 64530 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	506	34.9
3-5	562	38.8
6-8	244	16.8
9-11	91	6.3
12-14	34	2.3
15-17	12	0.8
18-20	1	0.1

Table A67. **Distribution of Age at Enlistment for the 1977 AFSC 64530 Population**

Age (Years)	Number	Percent
17	2	0.1
18	318	21.9
19	487	33.6
20	240	16.6
21	146	10.1
22	84	5.8
23	61	4.2
≥24	112	7.7

Table A68. **Distribution of the PEI Scores for the 1977 AFSC 64530 Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	618	42.6
2-3	490	33.8
4-5	212	14.6
6-7	86	5.9
8-9	32	2.2
10-11	9	1.0
12-13	2	0.1
>13	1	0.1

Table A69. **Distribution of Education for the 1977 AFSC 64530 Population**

1		0	
Number	Percent	Number	Percent
1,415	97.6	35	2.4

Table A70. **Distribution of Completion/Incompletion of High School Courses for the 1977 AFSC 64530 Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	1,213	83.7	237	16.3
Biology	1,178	81.2	272	18.8
Business Math	407	28.1	1,043	71.9
Chemistry	475	32.8	975	67.2
General Science	1,187	81.9	263	18.1
Geometry	823	56.8	627	43.2
Journalism	184	12.7	1,266	87.3
Photography	50	3.4	1,400	96.6
Physics	217	15.0	1,233	85.0
Trigonometry	283	19.5	1,167	80.5
English	1,412	97.4	38	2.6
General Business	467	32.2	983	67.8
Driver Training	1,104	76.1	346	23.9
Home Economics	560	38.6	890	61.4
Statistics	87	6.0	1,363	94.0
General Math	1,211	83.5	239	16.5
Shop Math	168	11.6	1,282	88.4

Table A71. **Means and Standard Deviations of the Independent Variables for the 1977 AFSC 64530 Population**

Independent Variable	Mean	SD
Mechanical	49.69	23.45
Administrative	76.39	12.31
General	72.51	14.38
Electrical	63.22	19.06
AFQT	63.48	14.76
Education	.98	.15
Algebra	.84	.37
Biology	.81	.39
Business Math	.28	.45
Chemistry	.33	.47
General Science	.82	.39
Geometry	.57	.50
Journalism	.13	.33
Photography	.03	.18
Physics	.15	.36
Trigonometry	.20	.40
English	.97	.16
General Business	.32	.47
Driver Training	.76	.43
Home Economics	.39	.49
Statistics	.06	.24
General Math	.84	.37
Shop Math	.12	.32
Age	19.98	2.07
PEI	2.34	2.15
PDA	4.11	3.12

Table [illegible]. Correlation Matrix of the Independent Variabl

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Journ
Mechanical	1.00	.05	.45	.66	.46	-.05	.06	.01	-.01	.08	-.03	.12	-.01
Administrative		1.00	.32	.12	.27	-.02	.15	.05	-.01	.12	.02	.19	.06
General			1.00	.59	.80	-.11	.15	.05	.00	.18	.01	.23	.03
Electrical				1.00	.71	-.13	.10	-.03	-.01	.12	-.02	.18	-.03
AFQT					1.00	-.13	.14	.02	-.01	.17	-.02	.22	.00
Education						1.00	.03	.05	-.02	.04	.01	.03	-.01
Algebra							1.00	.17	-.09	.26	.00	.46	.04
Biology								1.00	.04	.16	-.02	.17	.03
Business Math									1.00	-.08	.09	-.11	.00
Chemistry										1.00	.04	.36	.02
General Science											1.00	.01	.06
Geometry												1.00	.02
Journalism													1.00
Photography													
Physics													
Trigonometry													
English													
General Business													
Driver Training													
Home Economics													
Statistics													
General Math													
Shop Math													
Age													
PEI													
PDA													

Variables for the 1977 AFSC 64530 Population

Journ	Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
-.01	.02	.09	.10	-.02	-.04	.14	-.22	.09	.05	.18	.05	-.05	.09
.06	.03	.07	.14	.01	.00	.02	-.01	.10	.03	.02	.04	-.07	-.04
.03	.02	.11	.22	.01	-.02	.07	-.15	.13	-.01	.07	.17	-.05	-.03
-.03	.00	.16	.17	-.02	-.06	.09	-.19	.13	.04	.15	.09	-.07	.03
.00	.02	.15	.22	.00	-.05	.08	-.13	.12	.01	.08	.14	-.02	.02
-.01	.01	.00	-.05	.09	.06	.08	.00	-.02	-.01	-.07	.06	-.02	-.14
.04	.05	.15	.22	.06	-.06	.04	-.07	.09	-.12	.03	.01	-.05	-.06
.03	.07	.04	.11	.09	-.02	.01	-.03	.03	-.03	-.03	.07	-.05	-.05
.00	-.01	-.04	-.01	.03	.28	.00	.04	.18	.12	.08	.13	.05	-.04
.02	.11	.35	.35	.00	-.11	.03	-.08	.13	.01	-.01	.05	-.07	-.11
.06	.02	.02	.03	.07	.10	-.01	.06	.06	.27	.05	.07	-.08	-.08
.02	.10	.24	.39	.03	-.15	.06	-.10	.11	.01	.02	.04	-.06	-.08
1.00	.05	.01	.02	.02	.03	.06	.06	.10	.01	.00	-.02	-.02	-.03
	1.00	.10	.10	.03	.05	-.02	.03	.10	.05	.05	.08	-.01	-.01
		1.00	.36	.01	-.09	.03	-.06	.16	.06	.08	.09	-.02	-.09
			1.00	.00	-.09	-.01	-.07	.20	.08	.07	.12	-.05	-.09
				1.00	-.01	.10	.02	-.01	.07	.03	-.05	-.07	-.04
					1.00	.06	.11	.13	.09	-.01	.08	.02	-.01
						1.00	.04	.01	-.02	.05	-.07	-.05	-.04
							1.00	.01	.05	.02	-.05	.05	.00
								1.00	.09	.06	.20	-.02	-.06
									1.00	.11	.11	-.01	.00
										1.00	.00	-.03	.02
											1.00	.03	-.06
												1.00	.60
													1.00

Table A73. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1976 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	8	0.4
20-29	101	5.6
30-39	161	8.9
40-49	283	15.6
50-59	382	21.1
60-69	337	18.6
70-79	294	16.2
80-89	143	7.9
90-99	102	5.6

Table A74. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1976 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	18	1.0
20-29	75	4.1
30-39	194	10.7
40-49	206	11.4
50-59	315	17.4
60-69	319	17.6
70-79	257	14.1
80-89	235	13.0
90-99	194	10.7

Table A75. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1976 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	27	1.5
30-39	71	3.9
40-49	212	11.7
50-59	299	16.5
60-69	389	21.5
70-79	306	16.9
80-89	338	18.7
90-99	169	9.3

Table A76. **Distribution of the ASVAB General Aptitude Test Scores for the 1976 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	173	9.6
50-59	343	18.9
60-69	455	25.1
70-79	328	18.1
80-89	265	14.6
90-99	247	13.6

Table A77. **Distribution of the AFQT Scores for the 1976 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	6	0.3
30-39	146	8.1
40-49	302	16.7
50-59	367	20.3
60-69	370	20.4
70-79	288	15.9
80-89	226	12.5
90-99	106	5.9

Table A78. **Distribution of the PDA Scores for the 1976 AFSC 81130 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	702	38.8
3-5	646	35.7
6-8	329	18.2
9-11	97	5.4
12-14	29	1.6
15-17	8	.4

Table A79. **Distribution of Age at Enlistment for the 1976 AFSC 81130 Population**

Age (Years)	Number	Percent
17	40	2.2
18	307	17.0
19	634	35.0
20	362	20.0
21	219	12.1
22	112	6.2
23	65	3.6
≥24	72	4.0

Table A80. **Distribution of the PEI Scores for the 1976 AFSC 81130 Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	963	53.2
2-3	565	31.2
4-5	202	11.2
6-7	64	3.5
8-9	14	0.8
10-11	1	0.1
12-13	2	0.1

Table A81. **Distribution of Education for the 1976 AFSC 81130 Population**

1		0	
Number	Percent	Number	Percent
1,695	93.6	116	6.4

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Table A82. **Distribution of Completion/Incompletion of High School Courses for the 1976 AFSC 81130 Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	1,298	71.7	513	28.3
Biology	1,370	75.6	441	24.4
Business Math	425	23.5	1,386	76.5
Chemistry	465	25.7	1,346	74.3
General Science	1,558	86.0	253	14.0
Geometry	790	43.6	1,021	56.4
Journalism	238	13.1	1,573	86.9
Photography	83	4.6	1,728	95.4
Physics	243	13.4	1,568	86.6
Trigonometry	213	11.8	1,598	88.2
English	1,726	95.3	85	4.7
General Business	490	27.1	1,321	72.9
Driver Training	1,438	79.4	373	20.6
Home Economics	671	37.1	1,140	62.9
Statistics	63	3.5	1,748	96.5
General Math	1,581	87.3	230	12.7
Shop Math	532	29.4	1,279	70.6

Table A83. **Means and Standard Deviations of the Independent Variables for the 1976 AFSC 81130 Population**

Independent Variable	Mean	SD
Mechanical	60.48	19.91
Administrative	56.91	18.10
General	67.76	14.76
Electrical	64.82	17.05
AFQT	62.74	16.38
Education	.94	.24
Algebra	.72	.45
Biology	.76	.43
Business Math	.23	.42
Chemistry	.26	.44
General Science	.86	.35
Geometry	.44	.50
Journalism	.13	.34
Photography	.05	.21
Physics	.13	.34
Trigonometry	.12	.32
English	.95	.21
General Business	.27	.44
Driver Training	.79	.40
Home Economics	.37	.48
Statistics	.03	.18
General Math	.87	.33
Shop Math	.29	.46
Age	19.79	1.69
PEI	1.80	1.79
PDA	3.86	2.91

Table A84. **Correlation Matrix of the Independent Variables**

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Journ
Mechanical	1.00	.05	.26	.53	.41	-.12	-.05	-.08	-.04	-.01	.02	-.02	-.05
Administrative		1.00	.41	.18	.34	.01	.24	.12	.02	.18	.02	.22	.02
General			1.00	.49	.76	-.12	.17	.07	-.03	.17	.04	.22	.02
Electrical				1.00	.77	-.18	.11	-.03	-.05	.10	.00	.15	-.03
AFQT					1.00	-.19	.17	.03	-.07	.16	.03	.22	-.01
Education						1.00	.10	.13	.01	.08	.01	.08	.06
Algebra							1.00	.23	-.02	.28	.04	.48	.07
Biology								1.00	.03	.22	-.02	.21	.08
Business Math									1.00	-.02	.08	-.05	.07
Chemistry										1.00	.03	.39	.07
General Science											1.00	-.01	.06
Geometry												1.00	.05
Journalism													1.00
Photography													
Physics													
Trigonometry													
English													
General Business													
Driver Training													
Home Economics													
Statistics													
General Math													
Shop Math													
Age													
PEI													
PDA													

ariables for the 1976 AFSC 81130 Population

Journ	Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
-.05	.03	.02	-.02	-.04	-.07	.12	.00	.01	.03	.23	.11	-.01	.04
.02	-.02	.12	.16	.07	.01	.09	.04	.08	-.02	.03	.05	-.07	-.08
.02	.05	.12	.24	.03	-.03	.08	-.02	.06	-.05	.02	.12	.00	.00
-.03	.02	.08	.14	-.02	-.07	.06	-.01	.04	-.01	.14	.08	.00	.02
-.01	.05	.10	.21	.00	-.05	.06	.00	.05	-.02	.07	.09	.00	.01
.06	-.02	.01	.06	.14	.00	.04	.01	.01	.06	-.07	.11	-.03	-.20
.07	.03	.16	.23	.11	.00	.07	.05	.08	-.09	.05	.00	-.08	-.11
.08	.09	.09	.11	.11	.03	.02	.05	.04	.00	-.02	.05	-.05	-.12
.07	.00	.06	-.03	.03	.28	-.01	.07	.14	.12	.10	.08	.04	-.02
.07	.11	.31	.31	.07	-.05	.01	.00	.12	.02	.02	.06	-.03	-.12
.06	.03	.03	.03	.12	.03	.01	.06	.02	.19	.06	.11	.00	-.01
.05	.07	.21	.37	.11	-.04	.05	.00	.08	-.05	.03	.05	-.09	-.11
1.00	.08	.09	.02	.00	.09	.05	.09	.10	.03	.00	.02	.01	-.04
	1.00	.09	.03	.01	.05	.04	.06	.15	.04	.04	.05	.01	-.02
		1.00	.27	.00	-.01	.01	.02	.16	.02	.05	.08	.00	-.04
			1.00	.05	-.04	.02	-.01	.10	.03	.03	.06	-.04	-.07
				1.00	.01	.05	.03	.03	.12	.01	.04	-.04	-.07
					1.00	.04	.05	.11	.06	.07	.03	-.03	-.07
						1.00	.04	.00	.02	.02	.03	-.03	-.05
							1.00	.10	.06	.19	-.03	-.06	-.04
								1.00	.05	.08	.06	.05	-.01
									1.00	.09	.07	-.03	-.03
										1.00	.05	-.04	.03
											1.00	-.01	-.13
												1.00	.57
													1.00

Table A85. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1977 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	9	0.5
20-29	62	3.3
30-39	126	6.8
40-49	187	10.0
50-59	286	15.4
60-69	380	20.4
70-79	317	17.0
80-89	279	15.0
90-99	215	11.6

Table A86. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1977 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	35	1.9
20-29	94	5.1
30-39	222	11.9
40-49	205	11.0
50-59	296	15.9
60-69	274	14.7
70-79	246	13.2
80-89	296	15.9
90-99	193	10.4

Table A87. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1977 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	24	1.3
30-39	97	5.2
40-49	172	9.2
50-59	242	13.0
60-69	355	19.1
70-79	329	17.7
80-89	363	19.5
90-99	279	15.0

Table A88. **Distribution of the ASVAB General Aptitude Test Scores for the 1977 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	94	5.1
50-59	289	15.5
60-69	389	20.9
70-79	364	19.6
80-89	349	18.8
90-99	376	20.2

Table A89. **Distribution of the AFQT Scores for the 1977 AFSC 81130 Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	1	0.1
30-39	47	2.5
40-49	342	18.4
50-59	473	25.4
60-69	439	23.6
70-79	256	13.8
80-89	179	9.6
90-99	124	6.7

Table A90. **Distribution of the PDA Scores for the 1977 AFSC 81130 Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	611	32.8
3-5	654	35.1
6-8	360	19.3
9-11	159	8.5
12-14	58	3.1
15-17	16	0.9
18-20	3	0.2

Table A91. **Distribution of Age at Enlistment for the 1977 AFSC 81130 Population**

Age (Years)	Number	Percent
17	40	2.1
18	481	25.8
19	610	32.8
20	318	17.1
21	164	8.8
22	101	5.4
23	55	3.0
≥24	92	4.9

Table A92. **Distribution of the PEI Scores for the 1977 AFSC 81130 Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	827	44.4
2-3	593	31.9
4-5	283	15.2
6-7	106	5.7
8-9	35	1.9
10-11	12	0.6
12-13	3	0.2
>13	2	0.1

Table A93. **Distribution of Education for the 1977 AFSC 81130 Population**

1		0	
Number	Percent	Number	Percent
1,766	94.9	95	5.1

Table A94. **Distribution of Completion/Incompletion of High School Courses for the 1977 AFSC 81130 Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	1,401	75.3	460	24.7
Biology	1,461	78.5	400	21.5
Business Math	388	20.8	1,473	79.2
Chemistry	513	27.6	1,348	72.4
General Science	1,550	83.3	311	16.7
Geometry	824	44.3	1,037	55.7
Journalism	269	14.5	1,592	85.5
Photography	73	3.9	1,788	96.1
Physics	262	14.1	1,599	85.9
Trigonometry	261	14.0	1,600	86.0
English	1,785	95.9	76	4.1
General Business	426	22.9	1,435	77.1
Driver Training	1,454	78.1	407	21.9
Home Economics	582	31.3	1,279	68.7
Statistics	88	4.7	1,773	95.3
General Math	1,544	83.0	317	17.0
Shop Math	266	14.3	1,595	85.7

Table A95. **Means and Standard Deviations of the Independent Variables for the 1977 AFSC 81130 Population**

Independent Variable	Mean	SD
Mechanical	59.81	21.10
Administrative	63.40	18.88
General	71.76	14.67
Electrical	67.30	17.77
AFQT	69.95	14.68
Education	.95	.22
Algebra	.75	.43
Biology	.79	.41
Business Math	.21	.41
Chemistry	.28	.45
General Science	.83	.37
Geometry	.44	.50
Journalism	.14	.35
Photography	.04	.19
Physics	.14	.35
Trigonometry	.14	.35
English	.96	.20
General Business	.23	.42
Driver Training	.78	.41
Home Economics	.31	.46
Statistics	.05	.21
General Math	.83	.38
Shop Math	.14	.35
Age	19.63	1.84
PEI	2.29	2.14
PDA	4.50	3.37

Table A96. **Correlation Matrix of the Independent Variables for th**

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Journ
Mechanical	1.00	.15	.40	.59	.44	-.07	.02	-.04	-.06	.06	.01	.02	-.02
Administrative		1.00	.50	.20	.40	-.06	.24	.14	-.04	.17	.03	.23	.02
General			1.00	.56	.80	-.14	.19	.09	-.06	.22	.02	.24	.06
Electrical				1.00	.72	-.15	.14	.00	-.08	.16	.00	.17	-.02
AFQT					1.00	-.19	.20	.06	-.07	.24	-.01	.27	.01
Education						1.00	.03	.07	.05	.07	.02	.05	.05
Algebra							1.00	.23	-.07	.27	.03	.45	.06
Biology								1.00	.02	.22	.01	.22	.08
Business Math									1.00	-.03	.06	-.04	.04
Chemistry										1.00	.02	.40	.05
General Science											1.00	.06	.06
Geometry												1.00	.06
Journalism													1.00
Photography													
Physics													
Trigonometry													
English													
General Business													
Driver Training													
Home Economics													
Statistics													
General Math													
Shop Math													
Age													
PEI													
PDA													

ables for the 1977 AFSC 81130 Population

Journ	Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
-.02	.03	.02	.06	-.02	-.02	.15	.01	.05	.05	.15	.05	-.03	.05
.02	.06	.09	.18	.03	.03	.03	.00	.08	-.03	.03	03	-.11	-.09
.06	.05	.11	.20	.02	.02	.06	-.04	.09	-.01	.03	13	-.08	-.04
-.02	.04	.13	.19	-.03	-.02	.06	-.04	.07	.00	.13	.09	-.05	-.02
.01	.05	.15	.25	.00	-.02	.07	-.04	.10	-.01	.06	.13	-.04	-.03
.05	.03	.02	.04	.08	.01	.03	.02	.05	.01	-.02	.15	-.02	-.10
.06	.10	.16	.22	.08	-.01	.06	.03	.09	-.10	.03	01	-.06	-.13
.08	.09	.07	.12	.10	-.02	.01	-.03	.05	.00	-.03	05	-.09	-.10
.04	.04	.03	-.02	.02	.24	.02	.05	.16	.11	.08	09	-.01	-.02
.05	.12	.30	.40	.05	-.02	.01	-.02	.14	.03	.00	.09	-.04	-.09
.06	.05	.01	.01	.13	.07	-.04	.03	.08	.22	.05	.07	-.04	-.04
.06	.12	.26	.42	.07	-.05	.06	-.03	.12	-.05	-.02	03	-.07	-.12
1.00	.11	.09	.03	.07	.09	.08	.08	.12	.02	.01	05	-.07	-.03
	1.00	.09	.10	-.01	.02	-.01	.00	.12	.04	.03	.11	-.03	-.06
		1.00	.33	.04	-.01	.03	.00	.23	.05	.04	.09	-.05	-.07
			1.00	.04	-.02	.02	.01	.18	.07	.03	.07	-.03	-.08
				1.00	.02	.07	.03	.02	.08	.00	.02	-.02	-.03
					1.00	.01	.07	.13	.07	.02	.03	-.02	-.01
						1.00	.10	.04	.00	-.03	.03	.01	-.03
							1.00	.04	-.03	.07	-.05	.05	.02
								1.00	.05	.07	.20	-.02	-.04
									1.00	.10	.06	-.01	.00
										1.00	.01	.02	.02
											1.00	.02	-.08
												1.00	.66
													1.00

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Table A97. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1976 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	107	0.4
20-29	1,145	3.8
30-39	2,004	6.6
40-49	3,199	10.6
50-59	4,836	16.0
60-69	5,593	18.5
70-79	5,166	17.1
80-89	4,409	14.6
90-99	3,790	12.5

Table A98. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1976 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	907	3.0
20-29	1,570	5.2
30-39	2,489	8.2
40-49	2,404	7.9
50-59	3,960	13.1
60-69	4,427	14.6
70-79	4,034	13.3
80-89	5,291	17.5
90-99	5,167	17.1

Table A99. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1976 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	55	0.2
20-29	296	1.0
30-39	1,016	3.4
40-49	2,175	7.2
50-59	3,315	11.0
60-69	5,029	16.6
70-79	5,080	16.8
80-89	6,683	22.1
90-99	6,600	21.8

Table A100. **Distribution of the ASVAB General Aptitude Test Scores for the 1976 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval: Number	Percent
<50	1,527	5.0
50-59	3,907	12.9
60-69	6,065	20.1
70-79	5,755	19.0
80-89	5,447	18.0
90-99	7,548	25.0

Table A101. **Distribution of the AFQT Scores for the 1976 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval: Number	Percent
<30	52	0.2
30-39	928	3.1
40-49	2,915	9.6
50-59	4,262	14.1
60-69	6,568	21.7
70-79	5,443	18.0
80-89	5,734	19.0
90-99	4,347	14.4

Table A102. **Distribution of the PDA Scores for the 1976 BMT Population**

Score Interval	Airmen Falling in Score Interval: Number	Percent
0-2	10,989	36.3
3-5	10,813	35.7
6-8	5,429	17.9
9-11	2,079	6.9
12-14	703	2.3
15-17	185	0.6
18-20	39	0.1
21-23	10	0.0
24	2	0.0

Table A103. **Distribution of Age at Enlistment for the 1976 BMT Population**

Age (Years)	Number	Percent
17	629	2.1
18	5,809	19.2
19	9,280	30.7
20	5,361	17.7
21	3,279	10.8
22	2,092	6.9
23	1,477	4.9
≥24	2,322	7.7

Table A104. **Distribution of the PEI Scores for the 1976 BMT Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	14,530	48.0
2-3	9,844	32.5
4-5	3,985	13.2
6-7	1,296	4.3
8-9	387	1.3
10-11	144	0.5
12-13	38	0.1
14-15	18	0.1
>15	7	0.0

Table A105. **Distribution of Education for the 1976 BMT Population**

1		0	
Number	Percent	Number	Percent
28,534	94.3	1,715	5.7

Table A106. **Distribution of Completion/Incompletion of High School Courses for the 1976 BMT Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	23,697	78.3	6,552	21.7
Biology	23,594	78.0	6,655	22.0
Business Math	6,784	22.4	23,465	77.6
Chemistry	9,816	32.5	20,433	67.5
General Science	25,447	84.1	4,802	15.9
Geometry	16,066	53.1	14,183	46.9
Journalism	3,947	13.0	26,302	87.0
Photography	1,408	4.7	28,841	95.3
Physics	5,418	17.9	24,831	82.1
Trigonometry	5,899	19.5	24,350	80.5
English	29,029	96.0	1,220	4.0
General Business	7,342	24.3	22,907	75.7
Driver Training	24,115	79.7	6,134	20.3
Home Economics	11,644	38.5	18,605	61.5
Statistics	1,488	4.9	28,761	95.1
General Math	26,068	86.2	4,181	13.8
Shop Math	7,510	24.8	22,739	75.2

Table A107. **Means and Standard Deviations of the Independent Variables for the 1976 BMT Population**

Independent Variable	Mean	SD
Mechanical	63.58	22.52
Administrative	63.40	19.30
General	73.37	15.05
Electrical	71.03	17.72
AFQT	70.31	16.44
Education	.94	.23
Algebra	.78	.41
Biology	.78	.41
Business Math	.22	.42
Chemistry	.32	.47
General Science	.84	.37
Geometry	.53	.50
Journalism	.13	.34
Photography	.05	.21
Physics	.18	.38
Trigonometry	.20	.40
English	.96	.20
General Business	.24	.43
Driver Training	.80	.40
Home Economics	.38	.49
Statistics	.05	.22
General Math	.86	.35
Shop Math	.25	.43
Age	20.03	2.05
PEI	2.07	2.00
PDA	4.14	3.18

Table A108. **Correlation Matrix of the Independe**

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Jou
Mechanical	1.00	-.02	.25	.58	.38	-.08	.00	-.06	-.09	.03	.01	.05	-.0
Administrative		1.00	.49	.20	.41	.04	.24	.14	.02	.23	.03	.28	.0
General			1.00	.53	.81	-.05	.23	.12	-.04	.26	.02	.31	.0
Electrical				1.00	.75	-.09	.18	.02	-.07	.18	.00	.24	.0
AFQT					1.00	-.10	.23	.09	-.06	.24	.00	.31	.0
Education						1.00	.09	.11	.02	.09	.03	.10	.0
Algebra							1.00	.24	-.05	.29	.05	.49	.0
Biology								1.00	.03	.22	.04	.24	.0
Business Math									1.00	-.06	.08	-.09	.0
Chemistry										1.00	.04	.43	.0
General Science											1.00	.03	.0
Geometry												1.00	.0
Journalism													1.0
Photography													
Physics													
Trigonometry													
English													
General Business													
Driver Training													
Home Economics													
Statistics													
General Math													
Shop Math													
Age													
PEI													
PDA													

ependent Variables for the 1976 BMT Population

	Journ	Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
	-.03	.00	.09	.07	-.03	-.11	.12	-.18	-.01	.02	.22	.01	-.05	.08
	.07	.07	.14	.23	.08	.04	.04	.07	.11	.01	-.06	.13	-.07	-.13
	.07	.07	.19	.27	.06	-.04	.05	-.02	.11	-.01	-.02	.19	-.02	-.04
	.00	.03	.20	.23	.00	-.10	.08	-.10	.05	.02	.13	.07	-.05	-.02
	.05	.07	.20	.28	.04	-.06	.06	-.02	.09	.00	.04	.14	-.03	-.05
	.03	.02	.05	.08	.13	.03	.08	.02	.03	.02	-.02	.13	-.04	-.18
	.05	.07	.18	.25	.12	-.04	.06	.01	.08	-.06	.03	.03	-.09	-.16
	.06	.09	.09	.13	.15	.01	.04	.03	.07	.02	-.03	.07	-.06	-.13
	.06	.02	-.02	-.04	.04	.30	.00	.08	.15	.08	.09	.08	-.01	-.03
	.05	.15	.39	.42	.07	-.07	.01	-.01	.15	.04	.01	.12	-.06	-.16
	.05	.05	.03	.03	.13	.07	.01	.05	.05	.24	.07	.08	-.04	-.05
	.06	.09	.29	.43	.10	-.07	.05	-.02	.13	.01	.05	.08	-.09	-.18
	1.00	.06	.04	.03	.05	.05	.05	.07	.08	.03	.02	.00	-.01	-.04
		1.00	.12	.11	.03	.01	.02	.03	.10	.03	.03	.10	-.02	-.06
			1.00	.44	.04	-.05	.01	-.04	.16	.05	.08	.11	-.03	-.11
				1.00	.05	-.07	.01	-.05	.19	.08	.07	.11	-.07	-.14
					1.00	.04	.09	.06	.03	.09	.03	.02	-.04	-.08
						1.00	.02	.11	.13	.05	.02	.08	.00	-.04
							1.00	.03	.01	.01	.03	-.05	-.02	-.04
								1.00	.04	.05	.10	.03	.00	-.06
									1.00	.06	.06	.15	-.02	-.06
										1.00	.10	.09	-.03	-.03
											1.00	.01	-.08	-.03
												1.00	-.01	-.14
													1.00	.60
														1.00

Table A109. **Distribution of the ASVAB Administrative Aptitude Test Scores for the 1977 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	124	0.4
20-29	717	2.3
30-39	1,865	6.1
40-49	2,542	8.3
50-59	4,107	13.5
60-69	6,028	19.8
70-79	4,945	16.2
80-89	5,446	17.8
90-99	4,743	15.5

Table A110. **Distribution of the ASVAB Mechanical Aptitude Test Scores for the 1977 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	745	2.4
20-29	1,384	4.5
30-39	2,321	7.6
40-49	2,413	7.9
50-59	3,883	12.7
60-69	4,249	13.9
70-79	4,242	13.9
80-89	5,959	19.5
90-99	5,321	17.4

Table A111. **Distribution of the ASVAB Electrical Aptitude Test Scores for the 1977 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<20	55	0.2
20-29	259	0.8
30-39	1,119	3.7
40-49	1,899	6.2
50-59	2,813	9.2
60-69	4,688	15.4
70-79	5,106	16.7
80-89	7,202	23.6
90-99	7,376	24.2

Table A112. **Distribution of the ASVAB General Aptitude Test Scores for the 1977 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<50	1,232	4.0
50-59	3,631	11.9
60-69	5,731	18.8
70-79	5,819	19.1
80-89	6,216	20.4
90-99	7,888	25.8

Table A113. **Distribution of the AFQT Scores for the 1977 BMT Population**

Score Interval (Percentile)	Airmen Falling in Score Interval	
	Number	Percent
<30	8	0.0
30-39	498	1.6
40-49	4,375	14.3
50-59	6,529	21.4
60-69	7,125	23.3
70-79	4,658	15.3
80-89	3,915	12.8
90-99	3,409	11.2

Table A114. **Distribution of the PDA Scores for the 1977 BMT Population**

Score Interval	Airmen Falling in Score Interval	
	Number	Percent
0-2	10,350	33.9
3-5	10,889	35.7
6-8	5,648	18.5
9-11	2,394	7.8
12-14	878	2.9
15-17	272	0.9
18-20	72	0.2
21-23	14	0.0

Table A115. **Distribution of Age at Enlistment for the 1977 BMT Population**

Age (Years)	Number	Percent
17	543	1.8
18	9,589	31.4
19	9,082	29.8
20	4,272	14.0
21	2,460	8.1
22	1,599	5.2
23	1,112	3.6
≥24	1,860	6.1

Table A116. **Distribution of the PEI Scores for the 1977 BMT Population**

	Airmen Falling in Score Interval	
Score Interval	Number	Percent
0-1	13,011	42.6
2-3	10,221	33.5
4-5	4,643	15.2
6-7	1,772	5.8
8-9	557	1.8
10-11	209	0.7
12-13	85	0.3
14-15	16	0.1
>15	3	0.0

Table A117. **Distribution of Education for the 1977 BMT Population**

1		0	
Number	Percent	Number	Percent
29,446	96.5	1,071	3.5

Table A118. **Distribution of Completion/Incompletion of High School Courses for the 1977 BMT Population**

Course	Completion		Incompletion	
	Number	Percent	Number	Percent
Algebra	24,375	79.9	6,142	20.1
Biology	23,912	78.4	6,605	21.6
Business Math	6,130	20.1	24,387	79.9
Chemistry	9,799	32.1	20,718	67.9
General Science	25,271	82.8	5,246	17.2
Geometry	15,935	52.2	14,582	47.8
Journalism	3,978	13.0	26,539	87.0
Photography	1,208	4.0	29,309	96.0
Physics	5,335	17.5	25,182	82.5
Trigonometry	5,800	19.0	24,717	81.0
English	29,520	96.7	997	3.3
General Business	6,881	22.5	23,636	77.5
Driver Training	24,425	80.0	6,092	20.0
Home Economics	10,761	35.3	19,756	64.7
Statistics	1,244	4.1	29,273	95.9
General Math	25,577	83.8	4,940	16.2
Shop Math	5,631	18.5	24,886	81.5

Table A119. **Means and Standard Deviations of the Independent Variables for the 1977 BMT Population**

Independent Variable	Mean	SD
Mechanical	64.85	21.99
Administrative	66.36	18.91
General	74.26	14.64
Electrical	72.30	17.50
AFQT	66.56	15.67
Education	.96	.18
Algebra	.80	.40
Biology	.78	.41
Business Math	.20	.40
Chemistry	.32	.47
General Science	.83	.38
Geometry	.52	.50
Journalism	.13	.34
Photography	.04	.20
Physics	.17	.38
Trigonometry	.19	.39
English	.97	.18
General Business	.23	.42
Driver Training	.80	.40
Home Economics	.35	.48
Statistics	.04	.20
General Math	.84	.37
Shop Math	.18	.39
Age	19.63	1.98
PEI	2.35	2.16
PDA	4.39	3.37

Table A120. **Correlation Matrix of the Independent Vari**

Independent Variable	Mech	Adm	Gen	Elec	AFQT	Ed	Alg	Bio	Bus Math	Chem	Gen Sci	Geom	Journ	Pho
Mechanical	1.00	.02	.31	.60	.40	-.07	.03	-.04	-.08	.04	.01	.07	-.02	[illegible]
Administrative		1.00	.51	.21	.43	.00	.26	.13	-.01	.21	.02	.29	.05	[illegible]
General			1.00	.55	.82	-.10	.24	.11	-.04	.25	.01	.31	.05	[illegible]
Electrical				1.00	.72	-.11	.17	.01	-.07	.17	.00	.24	.00	[illegible]
AFQT					1.00	-.12	.23	.09	-.07	.24	-.01	.32	.04	[illegible]
Education						1.00	.05	.07	.02	.06	.02	.05	.02	[illegible]
Algebra							1.00	.22	-.06	.27	.03	.46	.04	[illegible]
Biology								1.00	.02	.21	.01	.22	.05	[illegible]
Business Math									1.00	-.07	.07	-.09	.04	[illegible]
Chemistry										1.00	.02	.40	.05	[illegible]
General Science											1.00	.01	.04	[illegible]
Geometry												1.00	.04	[illegible]
Journalism													1.00	[illegible]
Photography														[illegible]
Physics														
Trigonometry														
English														
General Business														
Driver Training														
Home Economics														
Statistics														
General Math														
Shop Math														
Age														
PEI														
PDA														

riables for the 1977 BMT Population

Photo	Physics	Trig	Engl	Gen Bus	Driv Tng	Home Eco	Stat	Gen Math	Shop Math	Age	PEI	PDA
.00	.09	.07	-.02	-.10	.13	-.16	.00	.04	.19	-.01	-.02	.08
.05	.15	.23	.07	.04	.04	.05	.09	.00	-.03	.10	-.10	-.13
.05	.18	.25	.05	-.02	.07	-.03	.09	-.01	.01	.17	-.04	-.06
.02	.18	.22	.00	-.08	.09	-.10	.05	.02	.12	.05	-.03	-.02
.05	.20	.27	.04	-.06	.08	-.04	.09	.00	.04	.13	-.03	-.06
.02	.04	.05	.11	.02	.05	.02	.02	.02	-.02	.07	.04	-.13
.05	.17	.23	.09	-.04	.04	.00	.07	-.09	.02	.01	-.10	-.16
.08	.08	.11	.12	.00	.03	.03	.05	.00	-.04	.06	-.07	-.11
.03	-.03	-.05	.02	.27	.02	.07	.13	.09	.07	.08	.01	.00
.11	.37	.39	.06	-.06	.02	-.02	.13	.02	-.01	.08	-.08	-.16
.04	.01	.02	.10	.05	.00	.03	.05	.24	.07	.08	-.01	-.01
.08	.29	.42	.08	-.06	.06	-.03	.11	.00	.02	.06	-.10	-.17
.05	.02	.01	.04	.06	.05	.07	.06	.02	.01	.00	-.01	-.02
1.00	.09	.09	.01	.01	.01	.02	.09	.03	.02	.10	-.02	-.04
	1.00	.41	.03	-.05	.01	-.05	.14	.05	.06	.08	-.04	-.11
		1.00	.04	-.05	.03	-.04	.18	.08	.06	.09	-.07	-.14
			1.00	.03	.07	.03	.02	.06	.01	.00	-.05	-.07
				1.00	.02	.08	.10	.05	-.01	.07	.01	-.02
					1.00	.05	.00	.01	.00	-.06	.00	-.02
						1.00	.02	.02	.04	.00	.03	-.02
							1.00	.06	.05	.15	-.02	-.05
								1.00	.08	.08	-.01	.00
									1.00	.00	-.01	.01
										1.00	-.01	-.11
											1.00	.64
												1.00

Table A121. **Distribution of the Navigator AFOQT Scores for the FY74 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	240	11.5
30-39	207	9.9
40-49	182	8.7
50-59	233	11.2
60-69	210	10.1
70-79	243	11.7
80-89	340	16.3
90-99	426	20.5

Table A122. **Distribution of the Officer AFOQT Scores for the FY74 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	152	7.3
30-39	236	11.3
40-49	209	10.0
50-59	235	11.3
60-69	295	14.2
70-79	246	11.8
80-89	267	12.8
90-99	441	21.2

Table A123. **Distribution of the Pilot AFOQT Scores for the FY74 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	78	3.7
30-39	161	7.7
40-49	193	9.3
50-59	168	8.1
60-69	271	13.0
70-79	319	15.3
80-89	320	15.4
90-99	571	27.4

Table A124. **Distribution of Age at Entrance to UPT for the FY74 Population**

Age (Years)	Number	Percent
<22	116	5.6
22-24	1,615	77.6
25-27	349	16.8
28-30	1	0.0

Table A125. **Distribution of Academic Background for the FY74 Population**

1		0	
Number	Percent	Number	Percent
647	31.1	1,434	68.9

Table A126. **Distribution of Martial Status for the FY74 Population**

1		0	
Number	Percent	Number	Percent
1,141	54.8	940	45.2

Table A127. **Distribution of Source of Commission for the FY74 Population**

1		0	
Number	Percent	Number	Percent
1,104	53.1	977	46.9

Table A128. **Distribution of Prior Service for the FY74 Population**

1		0	
Number	Percent	Number	Percent
188	9.0	1,893	91.0

Table A129. **Means and Standard Deviations of the Independent Variables for the FY74 Population**

Independent Variable	Mean	SD
Navigator	62.35	24.89
Officer	63.17	23.13
Pilot	69.18	21.61
Age	23.53	1.39
Prior Service	.09	.29
Academic Background	.31	.46
Marital	.55	.50
Source of Commission	.53	.50

Table A130. **Correlation Matrix of the Independent Variables for the FY74 Population**

Independent Variable	Navigator	Officer	Pilot	Age	Prior Service	Academic Background	Marital Status	Source of Commission
Navigator	1.00	.52	.50	-.04	-.07	.33	-.06	-.07
Officer		1.00	.31	.07	.03	.16	.04	-.20
Pilot			1.00	.12	.02	.11	.00	-.26
Age				1.00	.53	-.06	.23	-.42
Prior Service					1.00	-.04	.16	-.23
Academic Background						1.00	-.07	.07
Marital Status							1.00	-.08
Source of Commission								1.00

Table A131. **Distribution of the Navigator AFOQT Scores for the FY75 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	366	22.6
30-39	151	9.3
40-49	177	10.9
50-59	192	11.9
60-69	182	11.3
70-79	158	9.8
80-89	160	9.9
90-99	231	14.3

Table A132. **Distribution of the Officer AFOQT Scores for the FY75 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	349	21.6
30-39	188	11.6
40-49	161	10.0
50-59	172	10.6
60-69	176	10.9
70-79	194	12.0
80-89	184	11.4
90-99	193	11.9

Table A133. **Distribution of the Pilot AFOQT Scores for the FY75 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	104	6.4
30-39	167	10.3
40-49	197	12.2
50-59	153	9.5
60-69	192	11.9
70-79	218	13.5
80-89	235	14.5
90-99	351	21.7

Table A134. **Distribution of Age at Entrance to UPT for the FY75 Population**

Age (Years)	Number	Percent
<22	97	6.0
22-24	1,169	72.3
25-27	350	21.6
28-30	1	0.1

Table A135. **Distribution of Academic Background for the FY75 Population**

1		0	
Number	Percent	Number	Percent
400	24.7	1,217	75.3

Table A136. **Distribution of Martial Status for the FY75 Population**

1		0	
Number	Percent	Number	Percent
864	53.4	753	46.6

Table A137. **Distribution of Source of Commission for the FY75 Population**

1		0	
Number	Percent	Number	Percent
1,064	65.8	553	34.2

Table A138. **Distribution of Prior Service for the FY75 Population**

1		0	
Number	Percent	Number	Percent
217	13.4	1,400	86.6

Table A139. **Means and Standard Deviations of the Independent Variables for the FY75 Population**

Independent Variable	Mean	SD
Navigator	53.20	27.25
Officer	52.93	26.75
Pilot	64.35	23.18
Age	23.72	1.60
Prior Service	.13	.34
Academic Background	.25	.43
Marital	.53	.50
Source of Commission	.66	.47

Table A140. **Correlation Matrix of the Independent Variables for the FY75 Population**

Independent Variable	Navigator	Officer	Pilot	Age	Prior Service	Academic Background	Marital Status	Source of Commission
Navigator	1.00	.61	.45	-.01	.03	.28	-.02	.04
Officer		1.00	.22	-.03	.06	.18	.00	-.01
Pilot			1.00	.19	.08	.09	.01	-.20
Age				1.00	.62	-.01	.24	-.54
Prior Service					1.00	-.02	.13	-.38
Academic Background						1.00	-.04	.06
Marital Status							1.00	-.09
Source of Commission								1.00

Table A141. **Distribution of the Navigator AFOQT Scores for the FY76 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	256	19.0
30-39	156	11.6
40-49	152	11.3
50-59	168	12.5
60-69	141	10.5
70-79	141	10.5
80-89	143	10.6
90-99	188	14.0

Table A142. **Distribution of the Officer AFOQT Scores for the FY76 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	310	23.0
30-39	157	11.7
40-49	124	9.2
50-59	139	10.3
60-69	155	11.5
70-79	166	12.3
80-89	128	9.5
90-99	166	12.3

Table A143. **Distribution of the Pilot AFOQT Scores for the FY76 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	93	6.9
30-39	164	12.2
40-49	180	13.4
50-59	134	10.0
60-69	163	12.1
70-79	210	15.6
80-89	170	12.6
90-99	231	17.2

Table A144. **Distribution of Age at Entrance to UPT for the FY76 Population**

Age (Years)	Number	Percent
<22	42	3.1
22-24	1,079	80.2
25-27	221	16.4
28-30	3	0.2

Table A145. **Distribution of Academic Background for the FY76 Population**

1		0	
Number	Percent	Number	Percent
374	27.8	971	72.2

Table A146. **Distribution of Martial Status for the FY76 Population**

1		0	
Number	Percent	Number	Percent
780	58.0	565	42.0

Table A147. **Distribution of Source of Commission for the FY76 Population**

1		0	
Number	Percent	Number	Percent
1,233	91.7	112	8.3

Table A148. **Distribution of Prior Service for the FY76 Population**

1		0	
Number	Percent	Number	Percent
168	12.5	1,177	87.5

Table A149. **Means and Standard Deviations of the Independent Variables for the FY76 Population**

Independent Variable	Mean	SD
Navigator	54.11	26.62
Officer	52.32	26.84
Pilot	61.76	22.89
Age	23.69	1.46
Prior Service	.12	.33
Academic Background	.28	.45
Marital	.58	.49
Source of Commission	.92	.28

Table A150. **Correlation Matrix of the Independent Variables for the FY76 Population**

Independent Variable	Navigator	Officer	Pilot	Age	Prior Service	Academic Background	Marital Status	Source of Commission
Navigator	1.00	.62	.41	.04	.06	.33	-.01	-.13
Officer		1.00	.20	.02	.08	.24	-.04	-.12
Pilot			1.00	.14	.09	.14	.07	-.08
Age				1.00	.72	-.01	.19	-.51
Prior Service					1.00	.01	.12	-.58
Academic Background						1.00	-.02	-.03
Marital Status							1.00	-.07
Source of Commision								1.00

Table A151. **Distribution of the Navigator AFOQT Scores for the FY77 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	107	17.7
30-39	56	9.2
40-49	78	12.9
50-59	82	13.5
60-69	60	9.9
70-79	52	8.6
80-89	74	12.2
90-99	97	16.0

Table A152. **Distribution of the Officer AFOQT Scores for the FY77 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	108	17.8
30-39	68	11.2
40-49	57	9.4
50-59	76	12.5
60-69	68	11.2
70-79	78	12.9
80-89	78	12.9
90-99	73	12.0

Table A153. **Distribution of the Pilot AFOQT Scores for the FY77 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	31	5.1
30-39	55	9.1
40-49	62	10.2
50-59	75	12.4
60-69	85	14.0
70-79	106	17.5
80-89	82	13.5
90-99	110	18.2

Table A154. **Distribution of Age at Entrance to UPT for the FY77 Population**

Age (Years)	Number	Percent
<22	3	0.4
22-24	417	68.8
25-27	169	27.9
28-30	17	2.8

Table A155. **Distribution of Academic Background for the FY77 Population**

1		0	
Number	Percent	Number	Percent
171	28.2	435	71.8

Table A156. **Distribution of Marital Status for the FY77 Population**

1		0	
Number	Percent	Number	Percent
348	57.4	258	42.6

Table A157. **Distribution of Source of Commission for the FY77 Population**

1		0	
Number	Percent	Number	Percent
475	78.4	131	21.6

Table A158. **Distribution of Prior Service for the FY77 Population**

1		0	
Number	Percent	Number	Percent
171	28.2	435	71.8

Table A159. **Means and Standard Deviations of the Independent Variables for the FY77 Population**

Independent Variable	Mean	SD
Navigator	55.59	27.03
Officer	54.91	26.60
Pilot	64.32	21.61
Age	24.47	1.70
Prior Service	.28	.45
Academic Background	.28	.45
Marital	.57	.49
Source of Commission	.78	.41

Table A160. **Correlation Matrix of the Independent Variables for the FY77 Population**

Independent Variable	Navigator	Officer	Pilot	Age	Prior Service	Academic Background	Marital Status	Source of Commission
Navigator	1.00	.57	.35	.00	.00	.26	-.02	-.08
Officer		1.00	.14	-.04	.01	.14	-.01	-.03
Pilot			1.00	.05	.03	.12	.07	-.02
Age				1.00	.79	-.02	.14	-.64
Prior Service					1.00	-.05	.07	-.70
Academic Background						1.00	-.08	.02
Marital Status							1.00	-.07
Source of Commission								1.00

Table A161. **Distribution of the Navigator AFOQT Scores for the FY78 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval: Number	Percent
<30	99	18.3
30-39	75	13.8
40-49	58	10.7
50-59	58	10.7
60-69	52	9.6
70-79	56	10.3
80-89	46	8.5
90-99	98	18.1

Table A162. **Distribution of the Officer AFOQT Scores for the FY78 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	105	19.4
30-39	51	9.4
40-49	50	9.2
50-59	58	10.7
60-69	64	11.8
70-79	64	11.8
80-89	61	11.3
90-99	89	16.4

Table A163. **Distribution of the Pilot AFOQT Scores for the FY78 Population**

Score Interval (Percentile)	Undergraduate Pilot Trainees Falling in Score Interval	
	Number	Percent
<30	20	3.7
30-39	39	7.2
40-49	69	12.7
50-59	46	8.5
60-69	67	12.4
70-79	104	19.2
80-89	84	15.5
90-99	113	20.8

Table A164. **Distribution of Age at Entrance to UPT for the FY78 Population**

Age (Years)	Number	Percent
<22	0	0.0
22-24	416	76.8
25-27	92	17.0
28-30	34	6.3

Table A165. **Distribution of Academic Background for the FY78 Population**

1		0	
Number	Percent	Number	Percent
191	35.2	351	64.8

Table A166. **Distribution of Martial Status for the FY78 Population**

1		0	
Number	Percent	Number	Percent
278	51.3	264	48.7

Table A167. **Distribution of Source of Commission for the FY78 Population**

1		0	
Number	Percent	Number	Percent
476	87.8	66	12.2

Table A168. **Distribution of Prior Service for the FY78 Population**

1		0	
Number	Percent	Number	Percent
127	23.4	415	76.6

Table A169. **Means and Standard Deviations of the Independent Variables for the FY78 Population**

Independent Variable	Mean	SD
Navigator	55.01	27.53
Officer	56.07	27.25
Pilot	66.89	21.41
Age	24.14	1.90
Prior Service	.23	.42
Academic Background	.35	.48
Marital Status	.51	.50
Source of Commission	.88	.33

Table A170. **Correlation Matrix of the Independent Variables for the FY78 Population**

Independent Variable	Navigator	Officer	Pilot	Age	Prior Service	Academic Background	Marital Status	Source of Commission
Navigator	1.00	.68	.47	.06	.00	.36	-.03	-.11
Officer		1.00	.26	.04	.03	.23	-.01	-.09
Pilot			1.00	.13	.08	.14	.08	-.10
Age				1.00	.81	-.09	.23	-.80
Prior Service					1.00	-.13	.17	-.67
Academic Background						1.00	-.06	.11
Marital Status							1.00	-.13
Source of Commission								1.00

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AD-A091 106 AIR FORCE HUMAN RESOURCES LAB BROOKS AFB TX F/G 12/1
COMPUTERIZED ALGORITHMS: EVALUATION OF CAPABILITY TO PREDICT GR--ETC(U)
SEP 80 W G ALBERT
UNCLASSIFIED AFHRL-TR-80-6 NL

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SUPPLEMENTARY INFORMATION

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DEPARTMENT OF THE AIR FORCE
AIR FORCE HUMAN RESOURCES LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

Errata

REPLY TO ATTN OF: TSR

16 JAN 1981

SUBJECT: Removal of Export Control Statement

TO: Defense Technical Information Center
Attn: DTIC/DDA (Mrs Crumbacker)
Cameron Station
Alexandria VA 22314

AD-A091105

1. Please remove the Export Control Statement which erroneously appears the Notice Page of the reports listed [redacted]. This statement intended for application to Statement B reports only.

2. Please direct any questions to AFHRL/TSR, AUTOVON 240-3877.

FOR THE COMMANDER

Wendell L Anderson

WENDELL L. ANDERSON, Lt Col, USAF
Chief, Technical Services Division

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List of Reports

Cy to: AFHRL/TSE

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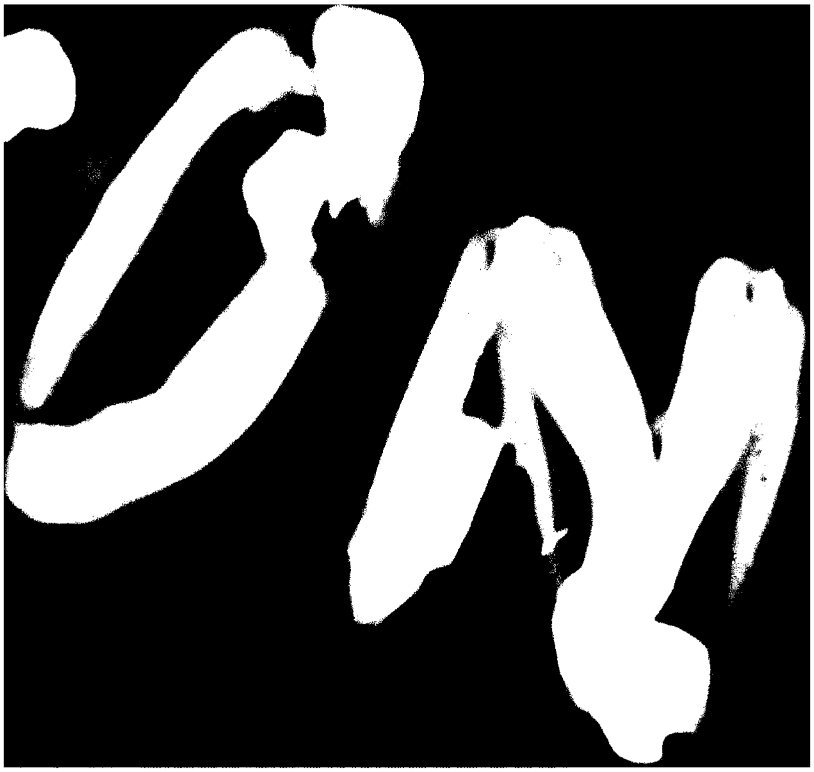

AD-A091 105 AIR FORCE HUMAN RESOURCES LAB BROOKS AFB TX F/G 12/1
COMPUTERIZED ALGORITHMS: EVALUATION OF CAPABILITY TO PREDICT GR--ETC(U)
SEP 80 W G ALBERT
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SUPPLEMENTARY

INFORMATION

AD-A091105

AIR FORCE HUMAN RESOURCES LABORATORY
Brooks Air Force Base, Texas 78235

Errata

Number	First Author	Title
AFHRL-TR-80-06 (AD-A091 105)	Albert	Evaluation of the Capabilities of Several Computerized Algorithms to Predict Graduation from Various Types of Air Force Training

Due to scoring errors which were found in the data files of the Air Force Officer Qualification Test — Forms L, M, and N, all analyses using aptitude scores derived from these test forms which are contained in the subject technical reports above are considered erroneous.

NANCY GUINN, Technical Director
Manpower and Personnel Division